Telephone Engineer

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Well Balanced Finance Needed

Recent activities in the security markets of the country have been almost entirely in the stock issues of corporations. The bond market has been practically stagnant and such new issues of bonds as have been offered have been made more attractive by the provision of stock conversion features or other privileges. Not only speculators, but investors who buy and hold securities for the return seem to have the feeling that stock equities and prospective earnings are attractive enough that well-seasoned stock have been purchased at prices where the actual dividend return is less than that of well secured bonds.

In view of this situation and of its success with recent stock issues, there has been some surprise in financial circles over the recent decision of the American Telephone and Telegraph Co. to issue convertible bonds for refunding and extension purposes. The terms and conditions of the issue and the reasons for making it in this form have not been given out, but it may be assumed that one important consideration has been the maintenance of a well-balanced proportion between stock and bonds outstanding in the hands of the public.

The A. T. and T. Company is in the position that it can adapt itself to market conditions and can place on the market the type of security that is best suited to the demands of investors at the time it sells the issue. In this respect it is not hampered as are some corporations with a badly balanced financial structure. This has been the situation with many of the railroads which for years have been financing their needs through bond issues until they have an excessively large amount of bonds outstanding. In some cases as, for instance, the Chicago, Milwaukee and Saint Paul, this has resulted in receivership and reorganization.

This has particular application to telephone financing outside the Bell System. Taking advantage of the good market for bonds during the last two or three years, a number of companies have been floated which depend largely upon bond issues for their financing. Their stocks, being unseasoned and with their earning powers still to be determined, find little or no market among investors and are largely held for control purposes. During a time like the present when the bond market is off, they are finding it difficult to secure additional terms.

Fortunately, as far as we can learn, there are not a great number of Independent companies in this condition, but those which are feeling the effect of the present financial situation are handicapped in the development of their properties. In the end both the companies and the public served by them will suffer from their financial short-sightedness. They are living examples of the difficulties that come from lack of balance in the financial structure.

Too Poor to Have a Telephone

Newspapers recently carried notices of the death of one of the pioneers of the automobile manufacturing business; a man whose name is still carried by one of the popular makes of automobile. This man after early struggles accumulated a considerable fortune and left the automobile field for other business. Financial reverses came and his last years were spent in very reduced circumstances. He did not own an automobile and as the reports of his death said, "he was too poor even to affort a telephone in his home."

This sentence, probably written unconsciously by the reporter, tells two important things about the telephone. One is that the telephone is regarded as one of the necessities of life and the other is that telephone service is furnished at a cost which enables every one except the very poor to have the service.

The logical conclusion of the reporter's statement is that anyone who can afford an automobile can afford a telephone. Yet we are told there are more

automobiles than telephones. This is said not in envy of the superior sales ability of the automobile industry but to emphasize what we have so often said about the possibilities of development that still exist in the telephone business. That we have not yet reached saturation in telephone station growth is evident in every place where the telephone company is blessed with an active commercial management. We will not reach saturation until every one has a telephone who "is not too poor even to have a telephone in his home."

"The Second Mistake Is Something Else"

There is a story of a steel mill superintendent who placed a new foreman in charge of the ore handling department of the plant. The new foreman had the ore piled too steeply in the yard and as a result the pile slipped and part of the ore went over the edge of the dock into the lake. The superintendent was asked if he had discharged the foreman and he replied, "The company has too much invested in that man to let him go now. It has just cost five hundred tons of ore to educate him to the proper piling angle of an ore pile. But if he makes the same mistake again, that will be another matter."

This man had an enlightened executive's view of an employee's mistake. Human beings will never reach the state of perfection that they will not make errors. The bromodic advice to avoid making the same mistake twice will always be necessary. Yet there are many men in charge of the work of others who take a hard boiled attitude even toward first mistakes and who feel that discipline of the job requires the exercise of the prerogative of firing a worker occasionally whether or not any real reason exists for discharging him.

It is seldom that the first mistake of judgment or performance is sufficient cause for the separation of a man from his job, but as the steel man said, "If he does it again, that is another matter." Repeated errors of the same type mean one of two things, either the employee is careless or he is not fitted for his job. When this condition exists, in fairness both to the job and to the man, he should be transferred to some other work for which he is better fitted or he should be allowed to find work for some other concern.

The Free Service Problem

The question of so-called free service or unlimited trunking service between exchanges has again come to the fore in a number of places due to the efforts of various companies to place toll charges in effect between points where subscribers formerly had use of trunk lines without charge. Probably there is no easier way for a telephone company to raise a storm of protest among its subscribers than to suggest that a toll charge be made where formerly there was none.

Pretty generally public service commissions have granted toll charges on the theory that those who use the service should pay for it. A portion of the public can be made to see the fairness of this position, but the great mass of unthinking people, paying little heed to the discrimination involved, object to toll charges because they feel something is being taken away to which they are entitled. It even extends to those who never use the free trunking service because they like to feel that they could use it if they ever wanted to.

There is no question that free trunking service has been extended to absurd limits in some territories. There are places where, theoretically at least, chains of a dozen or more exchanges have free interchange of calls. Practically, in most of these territories, after two or three trunks are connected through various switchboards, the possibility of holding a conversation vanishes. On the other hand, there is undoubtedly a large community of interest between adjacent towns and villages in certain areas and the grouping of two or even three small exchanges into one service area in some cases seems to be justifiable.

If everybody involved, both telephone management and public understood the elementary fact that there is no such a thing as free service; that all service must be paid for in one way or another, some of the conflicts that have come up would have been avoided. It is only a question of how much service is included in the primary rate. If free trunking is to be provided, obviously a higher primary rate is necessary than if service is limited to one office area.

If the public generally is willing to pay the necessary higher rate, there would seem to be no reason why telephone companies should not be willing to furnish free trunking service within reasonable limits. It must be understood that free trunking requires a greater number of circuits and therefore greater plant investment than where toll is charged. Also, consideration should be given to the fact that long distance calls suffer much delay where they must be routed over free service trunks.

One thing is certain, there has been too much free trunking in the past, but it is not certain that the remedy is immediate elimination of such service in all places. There is no general rule and each area should receive special study to determine what are the proper limits of service for the local exchange rates. Such studies and proper presentation of facts to the public might have avoided difficulties in which some companies have found themselves.

Program Service—Its Relation to Telephone Companies

By CHARLES H. BERGMAN

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Webster's dictionary defines the telephone as an instrument for reproducing sound—at a distance. Program service systems also provide means to reproduce sound at a distance. The telephone confines itself more or less to articulate speech, whereas program service equipment must reproduce articulate speech and also programs produced by musical instruments.

This close relation in final reproducing accomplishment naturally leads us to believe that telephone people would be the first to commercially venture into program service distribution by wire. This is absolutely what has happened.

Because telephone construction is designed especially to carry voice currents, the networks of telephone companies make the best available means for distribution of program service sound reproduction currents. Added to this the personnel of telephone organizations are particularly well adapted to cope with the problems which arise when programs are thus brought to the subscriber's premises. With these favorable fundamentals available, it is not surprising to find the successful program service companies are controlled, handled or operated by telephone people.

Further we find nearly all telephone companies, even those who are not actively engaged, very much interested in this newer form of reproducing sound at a distance over wire. There are some who are seriously considering serving the public by giving them entertaining programs, others who are studying the effect on telephone service and others who believe it advisable to simply keep in touch with developments.

This article is an attempt to review in a brief way some of the phases which have developed in connection with program service in its practical application. The more important points may be touched upon by giving consideration to the questions which would naturally arise if the formation of a new program service company were being considered.

Let us list four of these questions.

1. What steps are necessary to provide programs?
2. What type of service to render?
3. What type of equipment to provide??
4. What rates are required?

Under the first heading, "Steps necessary to provide programs," there are four general means in present-day use.

(A) *Radio receiver:*

Up to the present time the radio receiver has been the principal means used by program service companies for securing programs to be applied over their systems. It is usually installed in some electrically quiet location. The larger companies provide studios while the smaller companies employ a receiver installed in a residence.

When a breakdown in insulation or equipment occurs in the city power mains, it usually makes the neighborhood in the vicinity of the break noisy or non-receptive to radio receivers. In order to guard against this condition it is deemed advisable in many cases to provide more than one pickup receiver located at considerable distances away from one another. This is an insurance for continuous service. Some companies also provide reserve battery operated sets to guard against complete breakdown of city current supply.

The output of the radio receiver running between the studio and the central office is kept at a low level so as to prevent crosstalk in the cable through which it is carried. Ordinarily only the first audio stage is employed. A suitable step-down transformer is inserted between the output and the line, while a step-up transformer at the central office is placed between the line and the first amplifier in the central office.

It is necessary to choose the receiver equipment carefully. The very best quality obtainable is one of the chief essentials. If the program which is taken from the air is distorted or changed in character by the receiver, the result is reflected immediately over the whole system and the service rendered will only be the equivalent of low grade radio reception.

The low wave receiver is used to some extent by some companies, as the novelty of being able to introduce programs from foreign countries has considerable popular appeal.

(B) *Programs wired from broadcast stations:*

This means of providing programs for program service patrons has many advantages in its favor and should be given consideration where the possibilities of its adoption are at hand.

When programs are wired directly from the broadcast studio to the input feeding the amplifiers of the program system such annoyances as fading, static and local interference are practically eliminated.

In view of the fact that legislation is being sought by certain groups, which if enacted into law would prohibit picking up programs by receivers and retransmitting them over wire except permission be given by the originating station, it would seem that established connections with broadcast stations are highly desirable. If such a station were associated with one of the national chains it would add considerably to its value. Programs of general public interest would be thus assured to the patrons as they occurred.

One of the visions of forward looking program service operators is the establishment of one or more large studios at convenient locations to which those interested might subscribe for wire service.

(C) *Microphone equipment:*

A factor that makes program service decidedly popular with the patrons is its ability to bring to the subscribers items of local interest. Athletic events, assemblies, concerts, church services and the like, popularize program service in the home. Unless there is a broadcast station in the vicinity, this type of service is one which ordinary radio does not supply.

The microphone is the instrument used

CONVENTION SCHEDULE

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 16th, 17th and 18th.

Iowa Independent Telephone Association, Hotel Des Moines, Des Moines, April 23d, 24th and 25th.

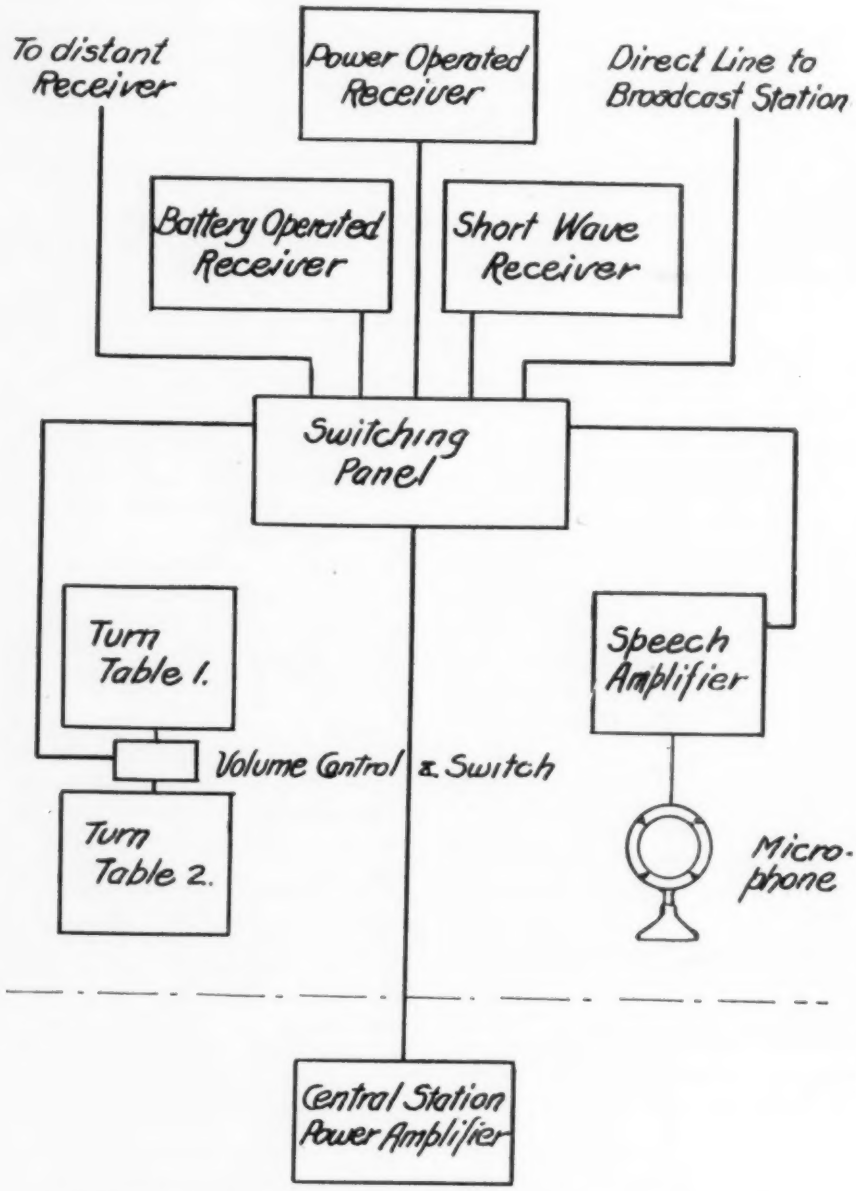
Indiana Telephone Association, Hotel Claypool, Indianapolis, May 7th, 8th and 9th.

Up-State Telephone Association, Seneca Hotel, Rochester, N. Y., May 22d, 23d and 24th.

Pennsylvania State Telephone and Traffic Association, Harrisburg, May 28th and 29th.

to pick up this type of program. High quality microphones and correctly designed speech amplifiers are required. The quality of reception for the local programs should compare favorably with those received from a distance.

When telephone companies enter the program service field, they at once find themselves in possession of another means of building and stengthening the good will of the community. The intimate service rendered brings about closer and more personal contacts.



TYPICAL SET-UP OF ORIGINATING EQUIPMENT FOR PROGRAM SERVICE SYSTEMS.

(D) *Magnetic pick-up:*

Phonograph programs are extensively used by program service companies. They make very desirable "fillers." If records are properly selected instructional, musical or humorous hours can easily be arranged. Music houses are usually found willing to cooperate in providing electrically cut records, especially if the source of supply is mentioned by the announcer.

Some consideration must be given to the method of applying this type of entertainment. It is necessary to keep the speed of the turntable uniform, therefore electrically operated outfits are best fitted for the job. Dual turntables make record productions easy to handle because the delays occasioned by changing the discs are overcome.

Referring to the second question: "Type of service to render," the following subdivisions may be considered:

(A) *Number of programs offered simultaneously:*

The greater percentage of program service companies are now offering but one program at a time to their subscribers. However, most of these companies believe that it would be desirable to be able to offer the public the choice of two or more programs.

In the purely audio systems which are extensively used, some solutions are available. Two or more wire systems may be run to each speaker location with line selecting jacks at the speaker location. Single party service may be provided with keys or dial at the home by which a choice of programs may be selected. The line mechanism at the central office stops the program selected to the pair of conductors running to the subscriber's station. Both of these means are quite expensive; the first because of the number of line pairs required and the second because only one subscriber's speaker to a line can be operated.

Another form by which more than one channel may be provided is the carrier current type. This is touched upon in subsequent paragraphs.

(B) *Hours of service:*

It is important to have a definite plan arranged for the time service is to be given. It requires a different grouping in the personnel of the plant if service is given 18 hours of the day or if it is given for only eight hours.

In battery operated plants this time factor is of significant importance because charging machines and battery installations must be made on a predetermined time set-up.

(C) *Paid programs:*

Under this heading particular attention is directed to programs used as advertising mediums and which are a source of revenue to the operating company. Care should be taken to find out by previous rehearsal whether these programs will have definite interest to large groups of subscribers. Sometimes a very mediocre subject may be made highly interesting when thought and talent are applied. As an instance of what may be done, it may be mentioned that one company advertises theater programs. In so doing, they announce that free theater tickets will be given to a certain number of people, selected from the directory. People just naturally wish to listen and considerable public interest is aroused in the campaign. If the fortunate subscriber is directed to apply for the tickets at the program service office a personal contact of good will value can be made.

(D) *Service to collective groups:*

A definite service which the program service company can probably render to better advantage than by any other means is providing entertaining programs for hotels, apartment houses, hospitals, institutions, etc.

This type of service can either be made by direct feeders to the main system or by separate systems. A close

analogy is the P. B. X. in the telephone plant. The maintenance and service rentals can be handled in a manner comparable to the present telephone plan.

Taking up the third question: "Type of equipment to provide." Under this heading we find there are two different types of equipment which have been given serious consideration by operating companies.

Central office equipment layout for small program service installation

(A) *Carrier current system:*

Several years ago telephone people were much interested in General Squier's system for multiplex telephony in which high frequency carrier currents were applied to physical telephone circuits.

An outgrowth of this idea is the saturation of a wire network with high frequency currents. Each of these applied currents is modulated with a program so that with the proper receiving equipment a selection of programs may be obtained.

This type of system is the one which has been adopted by companies who contemplate the use of power wires in distributing the service. Power companies have many obstacles to overcome such as physical barriers to the continuity of the circuits, shifting loads, introduction of noise, etc. However, progress has been made in making such service commercial.

Carrier wave applied to telephone networks makes each telephone pair connected to a subscriber's station an antenna for the prospective patron's set. When the system is correctly designed and maintained, multiple program service may be supplied over the circuit which is giving telephone service without interferring with transmission or signaling. Two of its advantages are that a choice of more than one program can be readily arranged for and that the telephone service lines are available for transmitting the programs to the subscriber without the use of additional copper.

The carrier wave system, whether propagated over power wires or over telephone wires, requires detecting and amplifying equipment together with a reproducer, at each subscriber's station. In other words a receiver less the radio frequency amplification is required. In order to give a high grade of service the tubes at each patron's station must be periodically inspected and maintained.

At the central station transmitters must be provided of sufficient capacity to properly saturate the wire network selected. In telephone networks two or three idle cable pairs are selected in each large cable group and the carrier is then applied directly to them. These wires inductively couple with the adjacent cable pairs so that every wire becomes a distributor. As many carriers are applied as the number of separate programs desired.

The carrier current selected must not conflict with present carriers used by long distance telephone companies upon their toll lines. Government regulation in this matter may ordinarily be expected.

(B) *Audio distribution system:*

Up to the present time it is found that the purely audio method of distribution has been more widely used by program service companies.

This type of system parallels telephone distribution inasmuch as audio frequencies only are carried from the central distributing point to the reproducers of the subscriber. Correctly designed amplifiers of sufficient output capacity impress the program selected upon cable pairs, which become the conductors to the loud speakers at the premises of the patrons.

Because the maintenance and upkeep of audio systems are similar to telephone units, it is not surprising to find telephone men as the chief sponsors of audio type program service systems.

At the subscriber's premises all that is required is a loud speaker and volume control together with the usual protective devices when the single channel system is used.

When multiple programs are produced the addition of some type of key or jack selection is necessary. All this indicates that the maintenance of program service stations is comparable to that of telephone stations.

Just as telephones are chosen today to reproduce and transmit speech efficiently, so loud speakers are selected to give the best in quality and naturalness. In fact, program service must ever compete in quality with high-grade radio.

In audio systems various forms of amplifying units have been installed for the central office speaker power supply.

(*Continued on page 23.*)

Studying Telephone Methods

By E. R. COLLINS

Manitoba Telephone System, Brandon, Manitoba

CHAPTER 26

Transfer or Trunk Circuits

The multiple switchboard was developed to overcome the difficulty found in giving service over switchboards, where the operator's cords and arms would not reach all the telephone line jacks on the switchboard.

There are, however, cases where small systems have been established of, say, 100 telephones, and have been added to, using 100 line sections. There comes a point when the reach becomes too great for the operators to make connections, and yet the cost of changing to a multiple type switchboard does not warrant the change. On such systems, the use of transfer or trunk circuits makes possible the operation of the same type of line equipment. The use of trunk circuits is necessary not only between sections of switchboards, but between switchboards in different buildings or different towns. The development of the automatic system is based almost entirely on the use of trunk circuits.

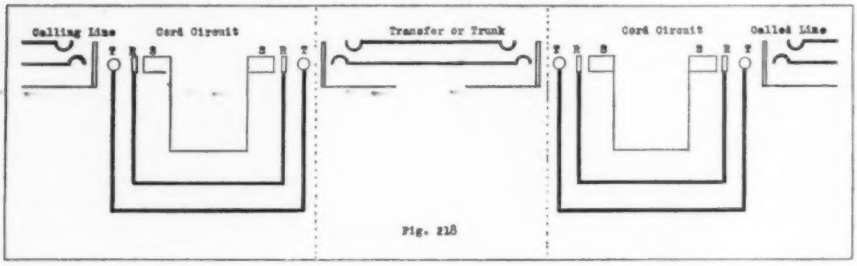


Fig. 218

Suppose in Fig. 218 that the calling line is located on, say, the 0-100 section of a switchboard, and the called line on the 0 to 400 section. Then the lines between these sections would be called trunks. Two pairs of cords would be necessary to complete the connection. Now since there will be more than one call at a time that may require to be trunked from one position to another, there must be several trunks between these two points. The number of trunks provided will be determined by the calling rate between these two points. This calling rate can be determined by peg count of call over a period of several days. However, for practical purposes a percentage of the telephones connected can be taken, say, 10 per cent of the telephones connected to the originating position. Where the same trunk is used for traffic in two directions, a higher percentage of trunks will have to be allowed. Lines then common to the traffic between switchboard sections are trunk or transfer circuits. Lines between exchanges or cities are called trunk circuits. There are automatic trunks, where the operator simply inserts the plug at the calling end, to signal the operator at the called end. Then there are trunks which are automatic one way as from a P.B.X. to the main common battery exchange, but require the Main operator to ring when calling the P.B.X. These can be used in both directions. Then there are one way trunks such as from a main operator to long distance or information or trouble. These are quite similar to ordinary exchange lines in that the operator rings on them to call the long distance operator, but have no signal on the main board to enable the long distance operator to ring the Main operator. The fact that all these circuits can be used by groups of subscribers in common, gives them the name of common or trunk lines or circuits.

In Fig. 219 is illustrated a very common type of transfer used on magneto switchboards between positions. They are automatic and two way. If a call originates at the "A" position the operator at "A" answers with her answering cord. If the call is to a telephone at position "B," the "A" operator can plug the calling cord into the transfer jack. The jack illustrated may have only five terminals, that is the ring and sleeve may be common where two-way plugs are used. Where three-way cords and plugs are used on a magneto board, the sleeve connection may be left dead. When the plug is inserted, the tip, ring and sleeve connections are made. But there is a fibre bushing resting against the tip spring. The rising of the tip spring moves spring 2 until it breaks contact with spring 3 and makes contact with spring 1. Then battery flows back over the contact of spring 1-2 to the normal 2-3 contact of the "B" jack, dividing, and part lighting the lamp at "A" and the other part the lamp at "B." The "B" lamp calls the "B" operator, and she inserts one of her answering plugs into the "B" transfer jack. This switches the contact of spring 2 of the "B" jack, to make contact with spring 1, breaking contact with spring 3. The contact of spring 3 at both jacks is now open, and both lamps go out. The "A" operator now knows that the "B" operator has completed the connection to the transfer jack at "B." Both lamps remain out while the connection is up. If the "B" operator takes her connection down first, then both lamps will burn again and the "A" operator seeing the lamp burn, while her plug is in, knows the connection is finished, and pulls out her plug and the both lamps go out. This further notifies the "B" operator that "A" has taken her connection down. The same action follows in the opposite direction.

Transfer Trunk Between Common Battery Positions

Where different common battery sections are not equipped with the multiple arrangement, a different transfer circuit may be used. The circuit shown in Fig. 219 shows five wires to each trunk. The circuit in Fig. 220 used only four wires per trunk. The jacks are the same as used in Fig. 219, only due to the com-

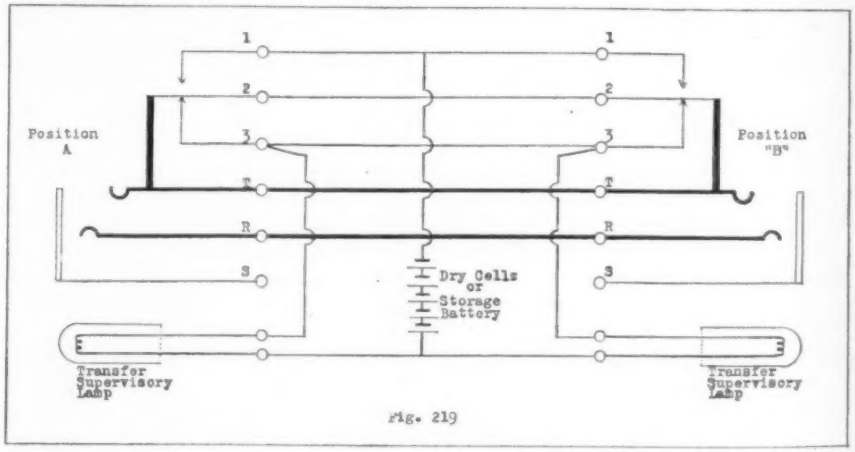


Fig. 219

mon battery boards being used, the lamps can be fed from a common source. Springs 1 and the sleeve connection can be grounded to positive battery. There is one change shown in the talking circuit of the trunk as shown by the heavy lines of Fig. 220. The tip of the "A" jack is connected to the ring of the "B" jack, and the ring of the "A" jack to the tip of the "B" jack. Suppose then a call originates at "A," the operator plugs into the transfer circuit. This lights the two transfer lamps as in Fig. 219. But the supervisory signal of the calling cord of the "A" operator still burns. Then the "B" operator plugs into the "B" jack and the two transfer lights go out. At the same time, there is a circuit completed from the grounded tip of the "A" calling cord over the tip of the "A" jack, to the ring of the "B" jack which goes through the supervisory relay of the "B" cord circuit to negative battery. This pulls up the "B" supervisory relay and puts out the "B" answering supervisory lamp. Then there is also the circuit from the grounded tip of the "B" answering cord connected to the tip of the "B" jack to the ring of the "A" jack to negative battery through the winding of the calling supervisory relay of the calling cord at "A." This puts out the supervisory lamp of the calling cord at "A." Both the operators now can get their supervision from the supervisory lights of the cord circuits. There is only one bad feature to this arrangement, and that is the subscribers and operators are subject to an annoying click when the plugs are being put in or taken out. A reversed cord would here spoil the supervisory scheme in using this trunk. If the positive tip is connected to positive tip and the negative ring to the negative ring, there will be no operation of the supervisory signals from the transfer circuit. Hence the reversal of the talking wires of the trunk circuit.

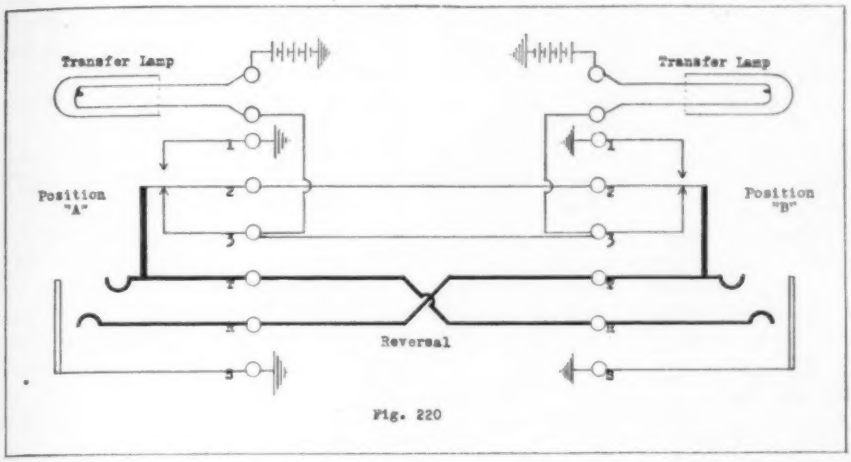


Fig. 220

Trunks Between Multiple Boards

Where two multiple common battery switchboards are located in different rooms, or different buildings, it is common practice to use an arrangement such as is illustrated in Fig. 221.

Here we have two exchanges we will call Main and West. There will be line lamps and jacks on each board, and also the multiple of these lines. Referring to the Main exchange. Suppose there were two switchboards set end to end, on the one, which we call the "A" board, there are the line jacks and lamps, and the multiple jacks. There will also be the operator key boards with common battery cord circuits. Now suppose we extend the multiple arrangement to the "B" end of the switchboard, similar to the "A" board, but without line lamps and jacks. For convenience we show the space that would be occupied by these as blank. The "B" board would not have cord circuits as the "A" board. Each "B" operator is supplied with an operator's circuit, and several cords and plugs. These are really cord circuits with only one cord. Each circuit has two lamps known as the supervisory lamp, and the disconnect lamp. The operator's circuit is not connected to the cord circuits at all except for one wire called a busy wire which will be explained later.

The Main "B" operator's circuit is connected with a pair of wires to a set of keys appearing at the West "A" board. These keys are called order buttons, and each West "A" operator will have one or more keys, which will connect her set to an operator on the Main "B" board. Similarly the Main "A" operators have their order buttons connected to order wires, which connect them to the West "B" operator's telephone circuits. Thus there is a direct method of allowing an "A" operator to speak to a "B" operator in another exchange without ringing.

There are also provided trunk circuits from the Main "A" board which end on strips of jacks below the line jacks. There will be a sufficient number of these trunks to take care of the traffic originating at the "A" position for the West exchange. These trunks appear before the West "B" operator with only a cord and a plug, and associated with this cord the suervisory, and disconnect lamps. There is a ringing key provided with each cord circuit on some of the older types of boards, but the more recent types have no key, the ringing being done automatically.

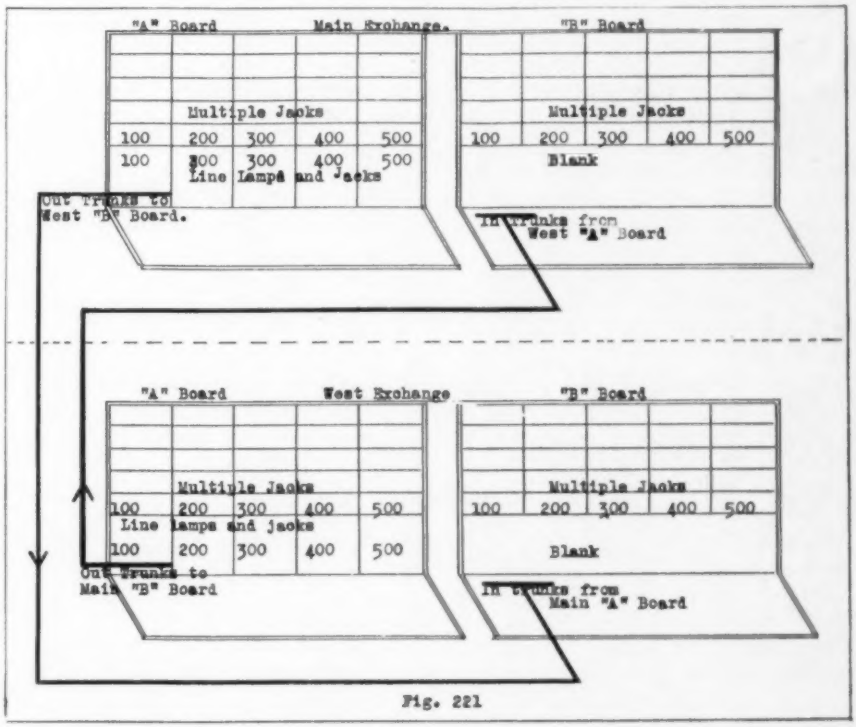


Fig. 221

There will also be trunks ending on strips of jacks before all the "A" operators at the West Exchange, and ending on cords and plugs before the "B" operators of the Main "B" switchboard.

Suppose now a call originated before

a Main "A" operator, calling for a West subscriber. The main operator answers in the usual manner, then finding the call is for the West exchange, she presses a West order button and repeats the West subscriber's number required. The West operator picks up an idle plug, and tests the multiple of the West line called. If busy, she repeats back busy, and the Main "A" operator gives the report to her subscriber. If the line is not busy, the West "B" operator tells the Main "A" operator the number of the trunk she is using, and the Main "A" operator plugs into the jack of this trunk. The West "B" operator then proceeds to ring the West subscriber, unless this is done automatically. The same method is used when calls originate on the West "A" board for the Main "B" board. Where several exchanges are involved the trunking system becomes quite complex.

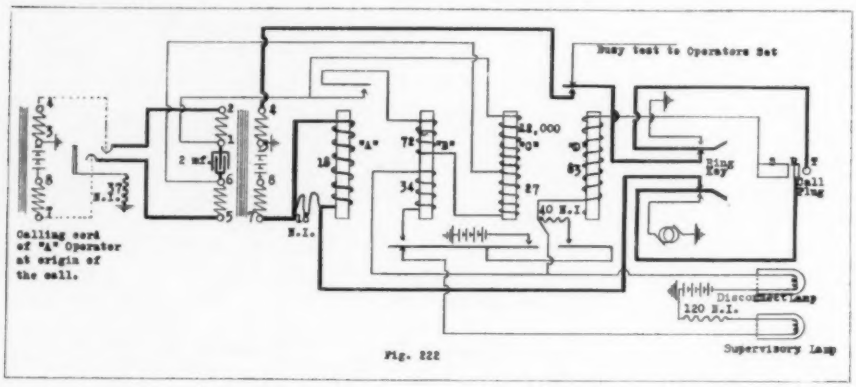


Fig. 222

In Fig. 222 is shown the circuit of an "A"—"B" Trunk, where the "B" operator does the ringing with a key. The Automatic Ring Feature and the Busy Back system will complicate the explanation and will possibly be dealt with under a different heading.

The jack of this circuit is located at the "A" board, and the sleeve will be grounded through a resistance at the "A" switchboard. Two wires of a telephone cable twisted pair are used to connect the jack at the "A" exchange with the balance of the equipment of the drawing, which will be located at the "B" switchboard. In this case we will assume that the jack is at the Main exchange and the relay and cord, etc., are located in the West exchange. When the West "B" operator tests the multiple of the line called, if the line is busy, she will hear a click due to the negative battery from the sleeve of the busy line flowing back over the tip of the trunk plug and cord. through the normal contact of the "D" relay to a coil winding of the "B" operator's circuit to ground. If the line is not busy the West "B" operator plugs into the line called. Then the sleeve of the called line will be grounded through the 30 ohm winding of the cut off relay of the called line. Battery flows through the disconnect lamp, Fig. 222, through the 83 ohm winding of relay "D" to battery, through the 30 ohm cut off relay winding of the called line. This pulls up the "D" relay, and connects the tip of the trunk cord circuit through in a talking position. If the "A" operator has not put her plug in yet, the disconnect lamp will burn as well, in series with the 83 ohm relay and the cut off relay of the called line. When the "A" operator inserts her plug, battery flows from her cord circuit over the trunk, through the 2-1 winding of the repeating coil, the 12,000 winding of the relay "C," through the 6-5 winding of the repeating coil back to the A cord at Main. This will pull up the armature of the 12,000 ohm winding of relay "C." This connects main battery through the make contact of relay "D" which is now pulled up, through the 40 ohm resistance through the 83 ohm winding of relay "D" through the cutoff relay 30 ohms to ground. This places a shunt around the disconnect lamp, and puts it out. This is similar to the circuit found in Fig. 209 in the February issue, where a 40 ohm shunt dims the lamp down so that it will not show through the lamp cap.

Battery also flows from the armature of the relay "C," which is now pulled up, through the normal contact of relay "B" through the supervisory lamp and 120 ohm resistance to ground, lighting the supervisory lamp. In Fig. 210 in the February issue we referred to a test set to test the supervisory signals so that they would not operate through a 10,000 ohm resistance. If the relay of the "A" cord circuit has been so adjusted, then it will not pull up through the 12,000 ohm winding of relay "C," so that the supervisory lamp of the Main "A" operator's calling cord will still be burning, and the supervisory lamp of the trunk, Fig. 222, will still be burning. Thus both "A" and "B" operator know that the called subscriber has not answered.

The "B" operator rings the called subscriber with her ringing key. When the called subscriber answers, battery flows through the 8-7 winding of the trunk repeating coil, through the 18 ohm winding of the supervisory relay, and the non-inductive 18 ohm winding, in parallel, through the ringing key contacts, the telephone and back through the make contact of relay "D," which is now pulled up, to ground through the 4-3 winding of the trunk repeating coil.

Relay "A" pulls up, and completes a circuit from No. 1 of the trunk repeating coil, through the contact of "A," which is now pulled up, through the 72 ohm winding of relay "B," the 27 ohm winding of the relay "C" to No. 6 of the trunk repeating coil. This makes a total of about 100 ohms across the 1-6 terminals of the trunk repeating coil, which allows enough current to flow from the "A" cord circuit to pull up the supervisory relay of the "A" calling cord, and puts out the supervisory lamp of the "A" cord.

At the same time the armature of relay "B" pulls up and cuts off the battery to the supervisory lamp of the trunk cord. Battery now flows from the make contact of "C," which is still pulled up, through the make contact of "B," through the 34 ohm winding of "B," through the 83 ohm relay "D" to ground through the cut off relay of the called line.

When the called subscriber hangs up, the relay "A" will release. This opens up the 72 ohm winding of relay "B" in series with the 27 ohm winding of relay "C." This allows the supervisory relay of the "A" calling cord to let go and light its lamp, giving the "A" operator a signal that the called subscriber had hung up his receiver. The "A" operator receiving the disconnect signal, removes her plug from the trunk jack. This cuts the battery away from the 12,000 ohm winding of the "C" relay, allowing the "C" armature to drop back. This removes the shunt from the disconnect lamp, which lights and gives the "B" operator a signal to take down the connection. When the "B" operator removes her plug, all relays are restored to normal.

If when the connection is up, the called subscriber should wish to signal the operator, it is not desired to show any signal before the "B" operator, because she has no means of talking to the subscriber. Therefore the signal must be given to the "A" operator so that she might come in on the connection with her listening key to ascertain the trouble. Since the releasing of the relay "A" opens up the 72 ohm winding of the "B" relay, the "B" relay would release and allow the supervisory lamp to light again. But the 34 ohm winding of the "B" relay is in series with the battery from the make contact of relay "C" and the ground through the "D" relay and the cut off relay of the called subscriber. Therefore relay "B" will remain energized, thus preventing a flash of the supervisory lamp, and the "B" operator is not disturbed. In this circuit, the 2 M. F. condenser provides a low imped-

ance path across the windings of the relays "C" and "B." When the 72 ohm winding of "B" and the 27 ohm winding of "C" are across these points, there is a low direct current resistance, and due to the small number of turns, the impedance of these would not be excessive. The condenser might be open, and still the trunk would talk quite well. Here is another place where some uniform method of checking the transmission losses is important, as a defective trunk might pass the notice of an operator and cause a great deal of trouble due to poor transmission.

The operation of the supervisory circuit also shows the importance of a uniform adjustment of the cord supervisory relays. This is much more important when it is remembered that defective cord adjustments might cause misleading reports regarding the operation of trunk circuits.

In Fig. 223 is shown the method used to connect two operators' talking circuits together. The sets at the "A" positions are equipped with condensers in the listening taps to the regular cord circuits to prevent the flow of battery from the cord circuit into the operators' circuit. The order wire taps may be taken off the L and LT taps direct to the order button or order key as it is shown in the drawing.

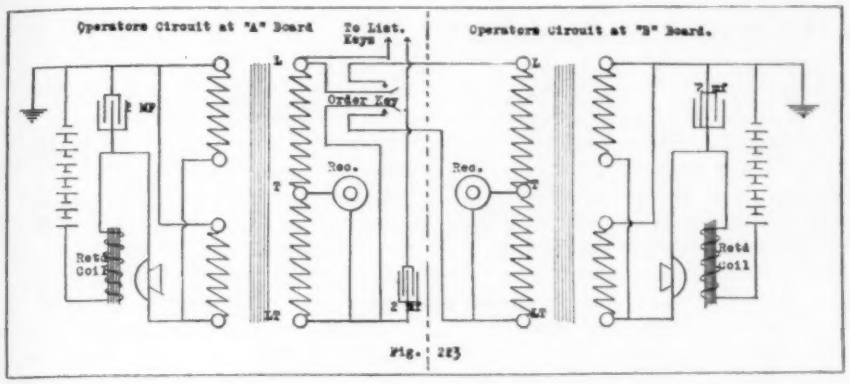


Fig. 223

The set for the "B" operator does not have any condenser in the line since there are no cord circuits connected with it. In our next chapter we will introduce the *Mechanics of the Stromger Automatic Telephone System.*

Program Service

(*Continued from page* 19.)

One system uses units providing power for only a limited number of speakers per amplifier. This sytem has the advantage of dividing the speakers in groups so that if an amplifier becomes defective or a line gets in trouble only a limited number of speakers are effected and the trouble can be readily segregated.

Amplifiers of larger output capacity are readily made by using larger output tubes in the last stage. Such amplifiers are capable of supplying a much larger group of loud speakers. A switching means is necessary for segregating groups of speakers in case of line trouble. To insure continuous central office service duplicate or spare amplifiers are required.

In districts where power failure is prevalent, much can be said for battery operated plants. Subscribers to the service seem to demand the same continuous service as the telephone plant has taught them to expect in the use of the telephone. It is therefore necessary to provide carefully against all failures.

The fourth question, what rates are required, has many interesting phases. Only a few of these will be taken up here.

Some operating companies started out in a semi-experimental way. They purchased or made some type of power amplifier and supplied a few loud speakers. Such systems were comparatively simple to operate and maintain, therefore low rates were established for the service. It was soon found, however, that an indefinite number of loud speakers could not be added without overloading the tubes and causing distortion or in some other way badly effecting the quality. Then when the necessary equipment to correctly handle the situation became necessary, it was found that the rates were inadequate.

This shows that good engineering should be employed in properly laying out the system to be used, as the amount to be charged against it is one of the factors required for establishing rates.

Those who have watched radio development know how fast public opinion changes with respect to betterments. This indicates at once that obsolescence for some time to come may be rather high and that it should be reflected in the rates.

At present the patent situation covering equipment used for program service work and the manner in which it shall be used is not altogether clear. Sooner or later license fees will probably be demanded for the use of the patent rights. Therefore the foresighted company will establish a reserve to cover these contingencies. This means another item to be taken care of in reimbursing the operating company.

Most program service companies also pay royalities to the American Society of Authors, Composers and Publishers for the use of their products. Rates must therefore be sufficient to cover such requirements.

As there seems to be some possibility that program service companies may be forced to provide all their own programs due to legislation which may prohibit the picking up and distributing of radio programs without permission from the originating station, this phase should receive the attention of operating companies in connection with rates.

Such legislation might force the program service companies to combine and establish centralized studios for production of programs to subscribing companies on a basis similar to that used over the present radio broadcasting networks which use long distance wire hook-up.

This would require a rather large expenditure for studios as well as for talent. However, as the broadcast stations would not be necessary and as the wire networks are now in the hands of telephone people, the cost per loud speaker may well be within the realm of possibility.

These items, together with such items as wire rentals and the usual fixed charges with which all telephone companies are familiar make it obligatory to have a rate which will take care of such details as well as to return a reasonable profit on the investment.

N. E. Stonacker Now with Stromberg-Carlson Company

George A. Scoville, sales manager of the Stromberg-Carlson Telephone Manufacturing Company, announces that N. E. Stonacker, who has been serving for the last two years as consulting engineer on traffic problems for the Rochester Telephone Corporation and the Stromberg-Carlson Company, will now be in a position to offer the full extent of his knowledge and service to all Stromberg-Carlson customers.

Mr. Stonacker is one of the outstanding traffic engineers of the country, having served with the larger operating companies in New York state. His knowledge, gained from an experience of many years in telephone work, will be of great help to prospective buyers of the larger switchboard units. His work, having necessitated a thorough and comprehensive study of main office problems and an understanding of the relation of types of equipment to low operating expense, enables him to recommend to the prospective purchaser the correct equipment for greatest economy.

Practical Suggestions for Plant Valuation

By CHARLES W. McKAY, M. E.*

It is only necessary to ascertain the value of the property to determine upon a fair rate of return on this valuation, and to provide rates adequate to produce this return. There are, of course other factors that enter into rate problems, but these are merely steps in the solution of the problem.

Early History of Rate Regulation.—Before taking up a detailed consideration of the problem of rate adjustment it may be interesting to review briefly the history of rate regulation and the part that it has placed in the development of the subject of public utility appraisals.

Long before the public utilities, as we know them, came into existence periodical attempts were made to regulate certain public enterprises. As suggested in the opening chapter, boat traffic on the River Thames was subject to a form of commission regulation early in the eighteenth century. A little later some of the stage-coach or bus lines operating in and about the city of London were subject to certain rules and regulations laid down by the county authorities. These early attempts, however, were never very vigorous, and were soon given up entirely.

In the latter part of the nineteenth century, with the advent of the modern public utilities, the State of Massachusetts took up the problem of rate regulation in earnest, and the first real public utility commission was formed. During the first few years of the Massachusetts commission's existence there was a reasonable doubt in the public mind as to whether the large expenditures involved in the establishment and maintenance of such a commission were justified. As time passed, and the public realized the good work that was being done in the way of regulating rates and improving the quality of the service of the various utility corporations in Massachusetts, the scope of the commission's work was enlarged and its future assured.

In the meantime, people in other states had been watching the experiment, and early in the twentieth century three new commissions were formed, two of them in the state of New York and one in Wisconsin. All of these early commissions gave special attention to the problem of rate regulation, and, as an aid to their investigation of rate problems, did everything in their power to develop the science of utility appraisement.

Development of Appraisal Methods.—At first, appraisals were made entirely by what may be termed "book value method." Estimates of value were made by accountants, based largely upon the record of property values as shown in the company's books. In some instances capitalization was the sole basis of determining property values. If a company was capitalized at $500,000, this figure was assumed to be the proper base for determining rates. In other cases a conscientious effort was made to determine the actual investment in the property as shown by the books. It was soon found, however, that the book value method gave most unsatisfactory results, and that records of original investment were often difficult to determine.

Next came the original cost method. Regulatory bodies and appraisal experts, having agreed that the book value method was a failure, cast about for a more satisfactory means of determining utility property values. The original cost method, as we have seen, consists of a careful determination of the actual original cost of a property. Records of original cost are often difficult to determine, and even when they can be determined they do not necessarily present a fair index of property values. Appraisal experts and commissioners soon found this to be the case, and again cast about for a satisfactory method of valuation.

Finally the reproduction cost theory was developed, and reproduction cost is now universally conceded to be one of the most important factors in the determination of fair utility values for rate-making purposes. Some of the leading legal authorities have ruled that original cost, depreciated value and capitalization should also be taken into account in determining the fair value of utility property; but they all concede that the reproduction cost, if not the most important, is at least one of the most important factors.

Distinction in Figures Used for Value.—In this connection it is interesting to note that one of the large western utility companies has, in its recent rate cases, made a distinction between "value" and "value for rate-making purposes." In other words, in submitting an appraised value of its properties to be used as basis for rate adjustments it reserves the privilege of claiming a much higher figure as the true value of the property.

In the matter of franchises, for instance, this company claims that its franchise privileges have a far greater value than the actual cost of securing the franchises, and it will be remembered that franchise cost is the only franchise value allowed by public utility commissions. The stand of this company is most interesting, and it may have considerable bearing upon future appraisal work.

Factors Involved in Solution of Any Rate Problem.—There are five factors to be taken into consideration in the solution of any rate problem. These factors may be briefly summarized as follows:

1. The value of the property as determined by the appraisement.
2. Operating expenses.
3. Annual depreciation.
4. Revenue.
5. Rate of return which may be allowed on the valuation.

Operating Expenses and Net Revenue.—The correlation of the five factors mentioned in the preceding section may perhaps be better understood with the aid of a simple illustration. Assume the case of a telephone company that has but one source of revenue from single party service at $2 a month, or $24 a year. If there are 1,000 subscribers the gross annual revenue of the company will amount to $24,000 a year.

To simplify the illustration we will assume that there is no funded indebtedness, and that the operating expenses consist merely of the actual cost of running the plant. Such operating expenses would include the salaries of employes, rentals, minor expenditures involved in the maintenance of the plant, and, in this case, taxes and insurance. It will also be assumed that the operating expenses are $14,000 a year. This will give an operating revenue of $24,000 less $14,000, or $10,000 a year.

We may further assume that an appraisal has been made of the plant, and that the reproduction cost of the physical property, including the collateral costs, is found to be $75,000. As pointed out in the last chapter, an allowance must be made for depreciation.

If we assume the annual depreciation rate to be approximately the same as that determined in the illustration of the preceding chapter, the annual amount to be deducted from revenue to provide for the annual depreciation will be approxi-

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mately 7½ per cent of $75,000—the reproduction cost of the physical property—or $5,625. This will serve as a further deduction from the operating revenue, and the net revenue will be $4,375.

Courts and commissions have almost universally agreed that any operating telephone company is entitled to earn a return not only on its investment in physical property but also on the business value. If we assume the business value in the case under consideration to be $25,000 (this $25,000 would include the cost of franchises, cost of financing and the cost of establishing the business) we will have a total reproduction cost of the physical property, and the attached business of $100,000.

Return on Investment.—Right here the question may arise in the reader's mind as to why reproduction cost is used as a basis for determining a fair return instead of present, or depreciated, value. Obviously, any business concern is entitled to earn a fair return on its investment, and the investment in the case under consideration is gauged by the reproduction cost of the property and its attached business. The fact that the property is constantly depreciating in value, and that its real value is always less than the reproduction cost, is recognized in that we are making a deduction from the earnings to set up a depreciation reserve fund.

If the net earnings amount to $4,375, and the reproduction cost of the physical property and the attached business amounts to $100,000, apparently the company is earning only 4.375 per cent on its investment. Obviously, the patient is sick; it only remains to carefully diagnose the case and find out just where the trouble lies.

Any one at all familiar with modern business will realize that the stockholders of any company are entitled to at least 6 per cent on their investment. People who have money to lend can invest in first mortgages, and sometimes in bonds, and be assured of a return of from 5 to 6 per cent on their investment. Obviously, a stock investment in any business enterprise if more hazardous than a bond or mortgage investment, and therefore the investors should be assured of at least as large a return as they can obtain from safer investments.

Considerations Affecting Net Eearnings.—If we assume 8 per cent to be a fair return on the stock of a public utility company, the company cited in our illustration should have an annual net earning of at least $8,000. What, then, is the trouble? Those who are not already versed in rate making problems will at once answer, "The rates are too low." However, this is not necessarily the case.

It may be that the capitalization is too high; that the reproduction cost, as represented by the appraised value of the property and business, is less than $100,000. If such were the case it will be obvious that the net earnings would be affected in two ways: in the first place, the amount to be set aside in depreciation reserve would be excessive, and in the second place, a reduction in the capitalization would necessarily result in a higher return on the investment. For instance, if the value of the property were $50,000 instead of $100,000, the $4,375 net earning would show a return of over 8 per cent instead of slightly over 4 per cent.

Again, it may be that the operating expenses—in this case, $14,000—are excessive. If a careful analysis of these two factors does not disclose the trouble it may be well to investigate the annual rate of depreciation. From the foregoing chapter the reader will readily realize that false assumptions as to the life or the salvage values of any of the component elements of a telephone property may result in an annual rate of depreciation which is too high or too low, as the case may be.

Without going into details it seems probable that the reproduction cost assumed in the illustration is a little high. There are only 1,000 subscribers, and a valuation of $75,000 for the physical property and $100,000 for the total property and business would mean a reproduction cost of $75 and $100, respectively, per station. Probably such a plant, adequate to serve 1,000 subscribers, would not average $50 per station for the physical property, and, say, $60 to $70 per station for the total reproduction cost, including the business. All of the foregoing items should be carefully considered before jumping at the conclusion that the rates are too low.

Before taking up the more complicated problem of rate-making the five factors already mentioned will be considered a little more in detail.

Valuation.—It is hardly necessary to dwell at length on the question of valuation. This phase of the subject has been discussed in considerable detail in the other chapters. It is sufficient to say that any rate investigation must be predicated upon a careful determination of the reproduction cost of both the physical property and the so-called intangible assets of a company.

Such a reproduction cost can only be obtained by first making a careful inventory of the physical property and then appraising this inventory with the aid of such unit costs as may be deemed fair at the date of the appraisal, and finally by adding an adequate allowance for the collateral costs and intangible values.

In considerng the question of vluation every effort should be made to ascertain whether the plant under appraisement is suitable for the purpose for which it is being used. In the illustration cited in the preceding section, the statement is made that a plant serving 1,000 subscribers would average about $50 a station for the reproduction cost of the physical property. Obviously, a plant with so low a reproduction cost per station would have to be composed largely of open wire, and the subscribers would have to be close enough together to eliminate long runs.

A condition might exist where, although $50 a station represented a fair reproduction cost valuation of the plant under consideration, it would be advisable to replace portions of the wire plant by aerial cable, and perhaps even to build a small amount of underground plant.

In such a case it may be argued—and rightly so—that rates based upon a reproduction cost valuation of the property, as it stands at the date of appraisal, would be entirely too low. The owners may contend that the contemplated improvements would so increase the investment that rates based upon a valuation of $50 per station would be inadequate to permit them to properly maintain the plant, furnish good service, and still earn a fair return on their investment.

Again, it may happen that the valuation of a telephone properly discloses the fact that the plant is more elaborate than the operating conditions warrant. For instance, if the 1,000-station plant we have been considering showed a reproduction of $100 per station for the physical property alone, and further analysis proved that the company was possessed of an excessive amount of costly underground conduit construction, it would obviously be unfair to force the subscribers to pay rates based upon the $100 per station valuation. In other words, the appraisal engineer must not only assure himself that the valuation of the property is a fair one, but he must also determine whether or not the plant is suitable to fulfill the requirements of the case in hand.

If the plant is inadequate, either due allowance should be made for this fact in determining the rates, or the rate investigation should be postponed until the company has installed all of the plant and equipment necessary to furnish good service to its subscribers, and until it is in a position to submit a fair valuation of the reconstructed property. If the plant is overbuilt it may be necessary to shade the reproduction cost valuation a little so that the subscribers will not be forced to pay for a lack of engineering foresight in planning the property.

Operating Expenses.—The operating expenses of a telephone company may be divided into four general headings, maintenance expenses, traffic expenses,

Since its introduction three years ago, the Type 24 dial has been tested by many independent agencies throughout the world interested in telephone development. The results of these tests, as well as observations made by hundreds of telephone companies of the operation of this dial in daily service, show it to be the most reliable, trouble-proof and durable dial ever produced.

STROWGER
TELEPHONE

How Quiet Is "Noiseless"?

THE scene: the office of a large architectural firm. The specification writer was discussing with a Strowger sales engineer details of a dial system to be installed for one of the architect's important clients.

"Now, as to the telephone instruments," said the specification writer, "we want them to be of the new hand type—Monophones, I believe you call them—equipped with your 'noiseless type' dials."

For a moment the sales engineer was at a loss. "Just what do you mean by 'noiseless type' dials?" he asked.

"That quiet-running type you furnished for the Union Carbide and Carbon Co. a short time ago."

"Those," replied the sales engineer, "were our standard Type 24 dials and the type that we furnish on all our telephone instruments, both for P-A-X and public exchange operation. I am glad, though, that the question came up, because if our dials are so quiet as to command particular attention and to be called noiseless, it's most certainly a point worth talking about."

The above conversation took place in New York a few weeks ago. It is interesting because with modern sound-proof walls, sound-absorbing floors and ceilings, noiseless typewriters, and the various other means which are daily being brought into use for reducing noises in busy offices, this characteristic of the Type 24 dial is worthy of special emphasis.

The principles of operation and the excellent materials and construction of the Type 24 dial, which have established it as the most durable and dependable in the world today, are also effective in making it as nearly noiseless as it is possible for a dial to be. It is one of the many features of superior design and construction which have placed it years ahead of any contemporary development.

Automatic Electric Inc.

Manufacturers of Strowger Dial Telephone Systems

Factory and General Offices: 1033 West Van Buren Street, Chicago, U. S. A.

Sales and Service Offices in All Principal Cities

EXPORT DISTRIBUTORS

For Australasia—Automatic Telephones, Ltd., Sydney

For Canada—Independent Sales & Engineering Co., Ltd., Vancouver

Elsewhere—The Automatic Electric Company, Ltd., Chicago

VGER AUTOMATIC
EPHONE QUIPMENT

commercial expenses, and general or miscellaneous expenses.

The maintenance expenses include such items as repairs, salaries, office and traveling expenses of superintendents and their assistants who are directly in charge of the maintenance of the telephone plant.

Traffic expenses include salaries, traveling and office expenses of the forces engaged in the supervision of traffic; salaries of telephone operators; cost of miscellaneous office supplies; cost of rest and lunch rooms; cost of operators' schooling; cost of central office stationery and printing, etc.

Commercial expenses include the cost of advertising, canvassing, accounting, collections, etc.

The general expenses include the salaries of general officers, the salaries of general office clerks, expenses incurred for stationery, supplies, cost of legal advice, insurance, amounts paid for accidents and damages, and all of the other miscellaneous expenses paid for accidents and damages, and all of the other miscellaneous expenses which cannot be classified under the headings, "Maintenance," "Traffic" and "Commercial."

Ordinarily, depreciation would be considered as a part of the maintenance expenses. However, for the purpose of the illustration, the item of depreciation is being considered separately. In fact, many public utilities, other than telephone companies, consider depreciation as a deduction from net operating revenue rather than as a part of the operating expenses.

Annual Depreciation.—It is hardly necessary to dwell at length upon the subject of annual depreciation. This subject has been discussed in considerable detail in the foregoing chapter. It might be stated that in determining the amount of annual depreciation it is first necessary to ascertain the reproduction cost of the physical property and the respective lives and salvage values of the component elements. An annual depreciation fund is then built up which will meet the requirements of the case under consideration.

Revenue.—Revenue of a telephone company may be divided into three general classifications—exchange service revenue, toll service revenue, and miscellaneous operating revenue.

The exchange service revenue, as the term suggests, includes the revenues derived directly from the sale of exchange service.

The meaning of the term "toll service revenue" is also apparent. Any telephone company of appreciable size has some provision for toll service. It may not own its own toll lines, but it at least will have an operating agreement with some larger company whereby its subscribers may receive the benefit of toll service.

If the company owns the toll lines, naturally all of the revenue derived from toll service will be included in the item "Toll Service Revenue." If the company does not own the toll lines, it probably will have a working agreement with a toll transmission company whereby it will receive a certain percentage of the gross revenue resulting from toll service. In a case of this kind the percentage thus received will be chargeable to toll service revenue.

Miscellaneous operating revenue includes such items as rentals for private or leased lines, messenger service, telegraph commissions, revenues derived from advertising in the directory, rentals from sub-leased property.

Rate of Return.—The rate of return which a telephone company may expect to derive from its investment is largely dependent upon the attitude of the utility commission under whose jurisdiction the company operates. In many states 8 per cent is considered a fair rate of return.

This question of the return which should be allowed to investors in public utility properties is a delicate one. It is certain, however, that no sane investor will consider buying the stock of a utility corporation unless he can be assured that he will obtain a larger return than he could if his funds were invested in mortgages or bonds. It is a well-known fact that first mortgages on farms, and sometimes on city property, can be obtained which will net a return of 6 per cent. All things considered, 8 per cent may be assumed to be a fair return on an investment in telephone stock, and this percentage will be used in the illustrations cited in the present chapter.

First Step in Illustrative Rate Investigation.—With the aid of the foregoing general discussion of the various factors that enter into a rate problem, and with the help of the simple illustration given previously, the reader will be able to readily follow the analysis of a more complicated rate problem.

It will be assumed that a company located in a town of about 10,000 population is giving exchange service to about 3,000 subscribers, and that it has applied to the State publicity utility commission for permission to increase its rates. To simplify the illustration, it will be assumed that the rates for exchange service are the only ones involved in the investigation, and that toll service is supplied by a separate toll company. In a case of this kind the only revenue derived from toll service by the exchange company would be in the form of a percentage on the total receipts from toll calls originating in the company's territory.

Naturally, the first step in a rate investigation of the kind under consideration will involve a complete valuation of the company's physical property and of the attached business. For the purpose of this discussion it is unnecessary to outline the various steps involved in the appraisal, this phase of the subject having been discussed quite thoroughly in previous chapters. It will be assumed that a careful engineering valuation has been made of both the physical property and of the so-called "intangible assets."

This subject of the function of the appraisal in rate making is so important that it cannot possibly be covered in the space alloted to one article. Hence, we will continue the discussion in the April installment and in that issue it is hoped to present some intensely practical suggestions as to the use of the appraisal in connection with purchase, sale, refinancing and merger matters.

Roanoke Rebuilding Completed

Recent installation of a new switchboard in the central office of the Roanoke exchange of the Home Telephone & Telegraph Company of Fort Wayne, Ind., completes the program of replacement and rebuilding which has been in progress there for the last six months, it was announced today by Harry E. Gray, general plant superintendent and chief engineer for the telephone company.

Roanoke now has a complete new telephone plant, Mr. Gray stated. This program of rehabilitation was instituted immediately after the Home Telephone & Telegraph Company acquired the Roanoke property, in order to bring the service in that exchange up to a standard of efficiency that would make for better communication within the Roanoke exchange and between Roanoke and Fort Wayne subscribers.

The program included, in addition to the installation of a new switchboard, a renovation of the Roanoke telephone office, the installation of a new main frame, and replacement of all outside plant facilities.

The cable to the central office exchange building was changed from aerial to underground and practically all poles were replaced and open wire plant was changed to cable. A complete new aerial cable distribution system within the town and one in the rural was constructed.

General rehabilitation work is now in progress in other outside exchanges owned by the company, including Churubusco, Leo, Harlan and Huntertown. This work will go forward until all of the plants have been completely reconstructed, Mr. Gray stated.

Geneseo, Ill.—Four hundred thirty-five miles of copper wire will be used by the local telephone company in completing its underground cable system in the city during the next six months.

Suddenly, out of a spring sky . . .

An Advertisement of the
American Telephone and Telegraph Company

All was well on the telephone front on April 27, 1928. Suddenly, out of a spring sky, rain began to fall over central Pennsylvania. As night came on this turned into a furious storm of sleet, snow and wind. Inside of 48 hours, 3700 telephone poles were down. Seven thousand miles of wire tangled wreckage. Thirty-nine exchanges isolated. Eleven thousand telephones silent.

Repair crews were instantly mobilized and sent to the scene. From Philadelphia 47 crews came. Other parts of Pennsylvania sent 13. New Jersey, 6. New York, 4. Ohio, 6. Maryland and West Virginia, 12. In record time, 1000 men were stringing insulated wire and temporary cables along the highways, on fences and on the ground.

Within 72 hours the isolated exchanges were connected and the 11,000 telephones back in service. Then, while the temporary construction carried on, neighboring Bell System warehouses poured out all needed equipment, new poles were set, new crossarms placed and new wire and cable run.

In any crisis there are no state lines in the Bell System. In all emergencies of flood or storm, as well as in the daily tasks of extending and maintaining the nation-wide network, is seen the wisdom of One Policy, One System, Universal Service. Better and better telephone service at the lowest cost is the goal of the Bell System. Present improvements constantly going into effect are but the foundation for the greater service of the future.

"The Telephone Books are the Directory of the Nation"

Important Development of Telephone Self-Cleaning Protector Block

By R. G. SANDS

President, Sands Electric Company, North Chicago, Ill.

In this discussion no particular attention will be given to the merits of the various types of heat coil, sub-station terminal or fuse protectors in common use today, except as these devices may help to clarify the phase of the subject with which we are most concerned.

Almost as old as the transmission of electric currents, is the subject of electric protection, and with the vast expansion of the network of high tension circuits, the necessity of adequate protection for the conservation of life and property has been recognized. In viewing this matter as applied to telephone, telegraph and railroad signaling systems, as well as the radio and other similar systems, it is found that operating companies and the public at large are favorable to the installation of sufficient protection, to insure against damages which may result from lightning and other high potential currents, coming in contact with circuits operating telephone, telegraph or other similar instruments. Almost without exception, every operating company, large or small, makes some provision for the protection of their exposed lines.

It will also be observed that in most cases, the kind of protection used has been determined, first: by the hazard which exists due to the line exposure; second: the operating value of the protector inserted; third: the interruption to service caused by the presence of the protector; and fourth: by the increased maintenance cost resulting from its use, little or no concern being given to the initial cost of the protective equipment itself.

Under certain conditions, it may be recommended that a protector having only discharge blocks is adequate. Other conditions may merit the use of discharge blocks and fuses and in still other instances, it may seem advisable to use discharge blocks and heat coils; but whatever the condition, the use of discharge blocks is quite universal and vital. Since the whole question of ample protection is so extensive, and complex, the consideration which follows will be directed toward the various types of protective discharge blocks now obtainable.

For years, engineers of operating companies and manufacturers have been giving thought to the development of a protector block which will give the desired protection without the excessive maintenance expense encountered in most of the types used both in the past and at the present time. Among those commonly

R. G. Sands

used, the best known perhaps are the plain and grooved carbon with either a mica or celluloid dialectric. The loaded carbon type with a dialectric and the solid metal blocks and a dialectric. Then there are the various air gap or so called self-cleaning blocks, using no dialectrics, often spoken of as the saw-tooth type, etc. All of these various forms have been used at more or less advantage, but in most of these types where there has been a reasonable degree of protection, there has also been interrupted service and high maintenance expense.

Where small air gaps have been used, with the carbon blocks, the tendency to dust has existed to the extent that some manufacturers have resorted to the coating of the carbon faces with celluloid cement, or other preparation to allay the dust and thus reduce maintenance expense. Processes of this kind have not proved satisfactory, because the breakdown voltage is then determined by the thickness of the film or coating applied to the face of the block and uniformity of operation is impossible.

In some instances, this condition has caused the breakdown voltage to be raised several hundred volts.

Some of the other blocks referred to as the air gap, self-cleaning types have been constructed with such wide air gaps in an endeavor to get away from maintenance expense, that they have been rendered inoperative on potentials when protection is needed.

It is also noted that in some of the present forms, metal blades are held by insulating materials which have a tendency to carbonize from the arcing current, causing leakage, and noisy lines. In practically all of the present blocks, either carbon to carbon, or metal to carbon, it is observed that as operation takes place because of the burning effect, the air gap is increased, which means that each successive operation must take place at a somewhat higher potential than the preceeding one, resulting in a less and less sensitive device. As a further precaution against maintenance expense and interrupted service, some manufacturers and operating companies have resorted to the production and use of a block which will not ground the line even under extreme conditions. The use of a non-grounding block may have been partly justified when lightning was practically the only hazard, but today, with the existing danger of crosses with light lines and power circuits, a block that will not ground is insufficient protection.

Without going into the matter of technical data, such as breakdown potentials and dialectric values, etc., but with the foregoing in mind, a patented automatic block is presented in the accompanying diagrams, which fulfills the most exacting

(Continued on page 34.)

Fig. 1

Fig. 2

COLUMBIA Gray Label Telephone Cells flash into immediate life the instant the receiver is raised. And they recuperate when the receiver is down. Their energy is not dissipated in waiting. These cells resist internal corrosion. They stay fresh and happy on the shelf when not in active service. Inaction does not deplete their energy.

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Telephone Batteries
Best by test–they last longer

A Tone Test Set for Improving Service

By T. DeWITT TALMAGE*

Transmission Engineer, Illinois Telephone Association, Springfield, Ill.

To furnish adequate and satisfactory service it is necessary for a telephone utility to furnish the necessary plant and equipment and to maintain the same that any subscriber's station may be connected with any other subscriber's station with the least possible delay and that the subscribers may carry on a conversation in a satisfactory manner.

In general, the grade of telephone service required by a community varies with the telephone development of the area. In particular localities special needs have to be considered in the determination of the grade of service to be rendered. In all cases, however, the general satisfaction of the majority of the users is the most important criterion of good service.

In the state of Illinois the Illinois Commerce Commission act requires that every telephone utility shall furnish adequate and efficient service to all of the subscribers and users of such service, and invests in the Illinois Commerce Commission the authority to formulate from time to time such standards and definitions of adequate and efficient service as it may deem just and reasonable.

Believing that the past establishment of standards for telephone service had been of material aid in bettering such service throughout the state, an investigation of the matter was instituted by the Illinois commission for the purpose of revising existing rules establishing standards for telephone service to meet demands from changing conditions. The rules and explanations promulgated in this revised order were the result of careful consideration and subsequent investigations with reference thereto.

The rules appeared as General Order 107 and dealt with many phases of telephone service among the most important of which were the subjects of proper maintenance of equipment and the elimination of interruptions and irregularities to the service.

Rule No. 5 of this order said in part: "Each telephone utility shall make such tests and inspections of lines and equipment as may be necessary to insure the maintenance and operation of such lines and equipment at high standard of efficiency.

The nature of these tests and inspections depends upon the kind of system, the kind of protective devices installed and the interference from storms and other external sources usually experienced. The commission does not desire to specify exactly the nature of these tests, but its inspectors will supervise the practice of the companies in complying with this rule and make suggestions relative to necessary changes in test practice."

In line with this thought it can be said that the higher standards of service rendered and demanded today require the use of every scientific precaution to keep equipment in continuous and satisfactory operation. Some readers will shy at the word "scientific," yet it does not include half so much red tape as they think. If for scientific we substitute systematic, the word loses its terrors. Scientific methods mean nothing more than thorough, detailed, accurate investigation and information.

As a result of just such investigations and studies transmission testing with alternating currents was developed. Transmission test sets are being used on a large scale by the more progressive companies and State Telephone Associations to prevent poor transmission conditions. The reason for this is that with standard transmission, numbers need not be repeated so often, and "wrong number" calls are reduced. Equipment is more efficient, operating costs are less, service is better, and public support is assured, when transmission is standard.

Transmission maintenance is in reality revenue maintenance, and it is important for that reason as well as because of the fact that it reduces complaints, and promotes better public relations.

The density of transmission is greatest in the telephone exchange because it is the center of the operating traffic. Here the equipment carries a heavy load and defects are quickly reflected in impaired service.

The switchboard is the medium with which the operator delivers a commodity, quick and satisfactory communication, to the customer. Because it enters into the quality of every call, it presents one of the most advantageous points to attract poor transmission.

The proper maintenance of switchboards is highly important, not only because correct maintenance gives a better grade of service, but the economy effected is a distinct savings in the cost of operating a telephone company. Experience shows that this item is one of the most neglected things in the smaller exchange.

Certain kinds of trouble which are detected by transmission measuring sets do not cause excess transmission losses which can be quantitatively measured. The most common trouble of this type is due to cutouts and openings which may be caused by dirty or loose connections and improper key and relay adjustments. While not causing a definite value of excess loss, this class of trouble affects the transmission adversely and in many instances is more serious and annoying than fixed excess losses.

It is possible to construct a simple testing set for detecting these troubles in switchboard circuits at a slight cost. The set utilizes an ordinary telephone receiver which for testing purposes is one of the most sensitive direct reading devices known. A telephone receiver will give a sensible indication with a current less than one-millionth of an ampere. The testing instrument proper is light, strong and stable in operation. The routine method of using it is simple, and skill in handling the set is acquired with little practice. To a person skilled in using the test set the indications of trouble are clear, positive and accurate.

The circuit which has been developed by the writer is shown in Fig. 1. The equipment shown in the circuit can be conveniently assembled in a suitably sized wooden box. The bottom of the box should be made so that it will straddle the keys and thus make possible, using it directly at the switchboard. The buzzer is enclosed in a sound proof packing so as not to interfere with the tone in the receiver. This test set can be easily and cheaply constructed from material and parts which are usually available in the average exchange. The set as shown is being successfully used in numerous exchanges in Illinois to detect a large number of faults which cause substandard transmission. By its use cutouts, noisy cords, undersized plugs, dirty plugs, poorly adjusted, dirty and corroded key and relay contacts, where such affect the talking feature of a connection are readily located in exchange and P. B. X. switchboards.

It is difficult to make use of direct current with either an indicating meter or a telephone receiver to locate this type of trouble. The circuit used is an im-

* Associate Member, American Institute of Electrical Engineers.

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provement over the ordinary buzzer test set because it stabilizes the volume of tone and lengthens the life of the buzzer contacts. The pitch or frequency of the tone may be varied merely by using different sized condensers in the primary and secondary circuits.

The test set is used by inserting the plugs of one switchboard cord circuit into the two jacks of the test box. When this is done a tone is heard, the volume of which is controlled by an ordinary rheostat shunted across the output terminals. Ordinarily a tester can note by shaking the cord, turning the plug in the jack, jarring the key shelf and otherwise disturbing the cord circuit under observation, any noisy, scratchy, high resistance contacts or cutout conditions.

Dust and dirt are the cause of many service interruptions and cases of poor transmission. For that reason care should be taken to prevent the accumulation of dust around the switchboard, ringing machines, charging machines and other equipment. The periodic use of a combined vacuum cleaner and blower will tend to improve conditions.

It is believed that the small cost required to carry out the above suggestions and testing routine pays big returns by enabling us to maintain the plant at a higher efficiency than would otherwise be possible.

An A-C. Tone Tester

(Designed by T. De Witt Talmage, telephone transmission engineer.)

Service Is Keynote of Texas Independent Telephone Convention

The predominating note of the convention of the Texas Independent Telephone Association, held at Fort Worth March 25 to 28, was service to the public and co-operation among operating companies to improve that service. This was stressed by President R. B. Still in his annual address, referred to again in the report of Secretary L. S. Gardner, and was emphasized by the association's distinguished guest, F. B. McKinnon, president of the United States Independent Telephone Association. Then, of course, the traffic conferences were especially arranged to better prepare the operating department for rendering the service which the companies are so anxious to give.

Attendance was almost up to that of last year despite the number of individual companies sold to syndicates or group operators during the year, and it was noticeable that most of the groups were represented. The attendance of traffic men and operators was, perhaps, a little above the average.

Besides President F. B. McKinnon of the United States Independent Telephone Association, who took for his subject "The National Telephone Situation," other nationally known figures in the telephone world who were on the program were E. R. Stonacker and H. M. Cox. Mr. Stonacker, who is consulting engineer of Stromberg-Carlson Telephone Manufacturing Co., spoke on "Traffic Engineering, a Guide to Economical Operating." Mr. Cox of the Diversified Investments, Inc., Kansas City, told of the "Advantages and Disadvantages of Commission Regulation," giving an outline of the powers and duties of regulating commissions and the requirements made of utilities, leaving his hearers to form their own opinions as to the desirability of commission regulations.

The legislative situation in Texas came in for general discussion, led by President Still and Vice-President J. B. Earle of Waco. It was pointed out that the bill for commission regulation, presented at the recent session of the Texas legislature, did not pass, but another such measure would perhaps be presented at the called session to be held in April.

As at former meetings of the association, the traffic conferences, conducted each day except the first day, proved to be very instructive. The first session was presided over by E. R. Evans of Waco and the others by Oscar Burton of Tyler. Among those who participated in the discussions during the conferences were Wm. Swan of Dallas, L. S. Gardner of Waco, Miss Anne Barnes of Des Moines, Iowa, Sam H. Shutt of Waco, R. E. Glaze of Fort Worth, C. R. Lee of Dallas, W. B. Reid of San Antonio and others, including operators.

The annual banquet was above the average in point of high class entertainment, and spcial interest was added when tokens of appreciation were presented L. S. Gardner, secretary of the Association, for his faithful work, and to C. A. Shock of Sherman, Texas, by employes of his organization on the twenty-fifth anniversary of his entry in the telephone field.

Officers elected for the ensuing year were: R. B. Still, Tyler, president; J. B. Earle, Waco, vice president; John W. Pace, Haskell, vice-president; John Y. Rust, San Angelo, vice-president; D. J. Johnson, Santa Anna, treasurer.

District meeting Illinois Telephone Association, Lincoln, Ill., Thursday, April 18. A good program guaranteed. Come.

Important Development of Self-Cleaning Block

(*Continued from page 30.*)

protective requirements without the disadvantages of high maintenance expense and interrupted service.

This new automatic block is constructed of a white porcelain frame which is non-carbonizing, a heavy metal element so inserted that it is free from the collection or piling up of dust and dirt found in the atmosphere. It is also enclosed in a manner so that no danger can result to an attendant in the insertion or removal of same from the device in which it is used. The dimensions of this block permit it to fit any standard protector occupying the same space as an ordinary grooved carbon. (Illustrated by Fig. No. 1.)

No dialectric is used, and the air gap is constant under normal conditions. As the metal element becomes electrically charged, the myriads of little points found on the face of the accompanying carbon stand in readiness to drain away the danger currents. Unlike other discharge blocks, as the carbin particles are loosened by the effect of the existing arc, they are deposited on the face of the metal element, thus maintaining not only a uniform air gap spacing, but also coating the face of the metal in a way that protects it from excessive burning. (Illustrated by Fig. No. 2.)

This new block will permit ordinary lighting discharges to arc across the gap from the metal elements to the carbon without grounding the line. But a cross with a high potential transmission line results in the line being grounded, which condition continues until the line has been cleared. As soon as the danger current is removed, the block element resumes its normal position automatically without the expense of personal attention. (Illustrated by Fig. No. 3.)

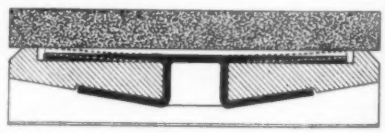
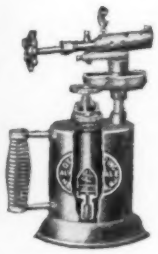


Fig. 3.

The simplicity and low cost of this New Automatic Protector Block with its protective advantages; its low maintenance expense and insurance against interrupted service, should interest every telephone operating company and its use in replacing the older types of blocks, is urgently recommended.

Geneseo, Ill.—Four hundred thirty-five miles of copper wire will be used by the local telephone company in completing its underground cable system in the city during the next six months.

In an Emergency!



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No other business puts as great a stress on preparedness as does that of the telephone service man. He must be ready at all times and under all conditions to work where his service is needed. And his tools, too, must be ready to work and work well when emergency calls. The unfitness of one solitary tool may mean an irreparable loss of time or money. THAT'S WHY MOST TELEPHONE COMPANIES HAVE STANDARDIZED ON "ALWAYS RELIABLE" TORCHES AND FURNACES AS AN INSEPARABLE PART OF THEIR EQUIPMENT.

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Open Wire Pole Line Construction

By RAY BLAIN

Most telephone construction men argue as much about specifications as they do about politics and seldom change their opinion about either. I have never considered that specifications should be carried out to the letter, but that the general idea only should be observed. Local conditions are always a governing factor and if the construction foreman understands his work he will in many cases be able to improve upon the specified method. Points disputed in specifications are generally of minor importance and have no real bearing on the quality of the completed job. For example, I am going to specify that the distance from the peak of the roof of the pole to the top of the first gain shall be eight inches. Some may claim that it should be six or less and others may say that it should be more, but in reality it doesn't make much difference as one is about as good as the other. Most everyone will agree on placing the crossarms on 24 inch centers while some others may prefer 18 inch. Both are good, except the 24 inch gives better clearance and is the one generally used. Specifications are also necessary to keep things uniform.

In these articles I am not going to argue about details but am going to attempt to cover a practical system of construction and only hope that it will be of benefit to some of the readers of *"Telephone Engineer."* Neither will I attempt to write anything startling or original as most everything I mention will be approved practice and methods. Some few kinks which I will mention I believe are somewhat original, or at least I have never heard of them before. I must admit that I climb much better than I write and could demonstrate what I mean better than I can possibly write about it, but, be that as it may, will do my best explaining.

Selection of Poles.

In the selection of poles to be used in the open wire line, consideration should be given as to the most economical pole to use in a particular exchange as to initial cost, transportation charges and life. In the first place, it is not economical to set an untreated pole as their average life is only about 14 years. If it is impossible to obtain treated poles the untreated ones can be given an average of five years' increase in life or a total of 19 years by applying creosote to the butts with a brush. Poles with the butts properly treated by the open tank or some other approved method have an average life of 24 to 29 years. The geographic location is a factor to be considered in deciding what is the most economical pole to use in an exchange. In the southern portion of the United States the yellow pine treated is perhaps the pole to use. In the western states, red cedar, butt-treated; Northern states white cedar, butt-treated; New England states, New England cedar, butt-treated, will perhaps prove the most economical, transportation and other things all considered.

In handling butt treated poles with carrying or cant hooks care should always be taken not to puncture the treated part. Only the outer or sap wood is impregnated during treating and if a hole is made through this into the center or heart wood the benefit of the treating is lost as this makes an unprotected spot where fungi can enter and decay start. If the treated butt is accidentally damaged during the unloading and hauling to the line, each case should be treated with creosote applied with a brush before setting.

It is generally understood that painting wood is a good way to preserve it and perhaps a cedar pole is about the only instance where this does not hold true. If the pole is not butt treated moisture creeps up through the heart wood and if the sap wood is sealed with paint this moisture has no means of escape and rot starts from the inside. Even though the butt be treated before the pole is painted, holes made by the lineman's spurs permits moisture to seep into the wood behind the paint and the pole does not dry out as fast as an unpainted one and its decay is more rapid. If a pole must be painted to comply with city ordinance or for any other reason, only one coat should be applied and that as thin a one as possible.

Butt treated poles should always be set

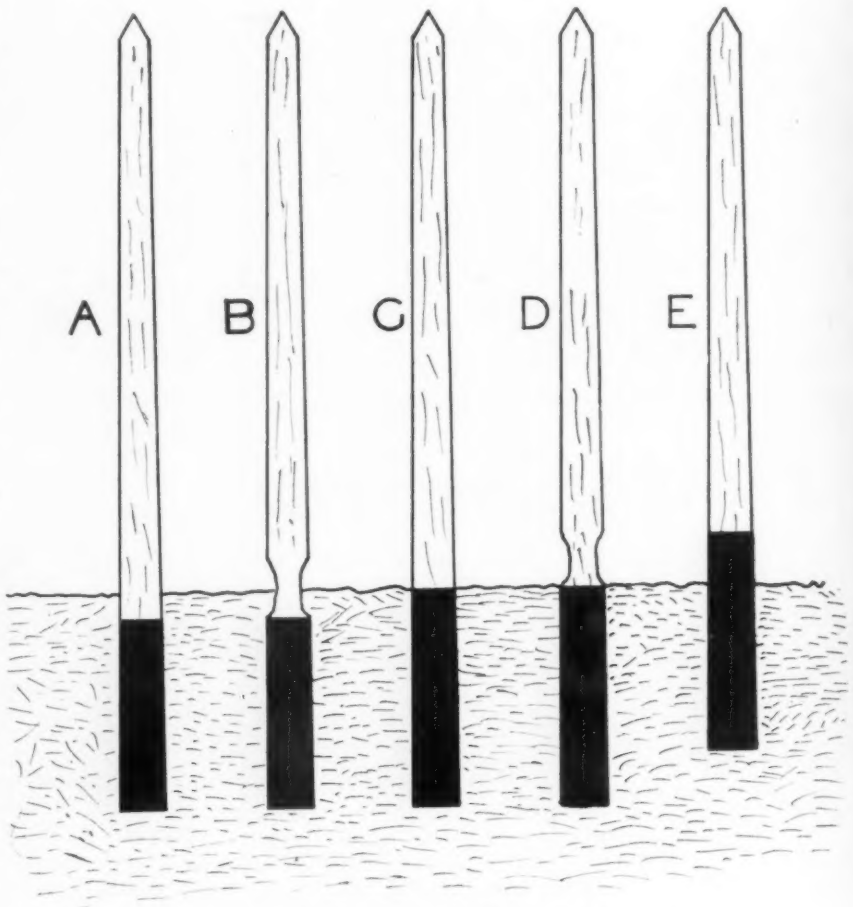
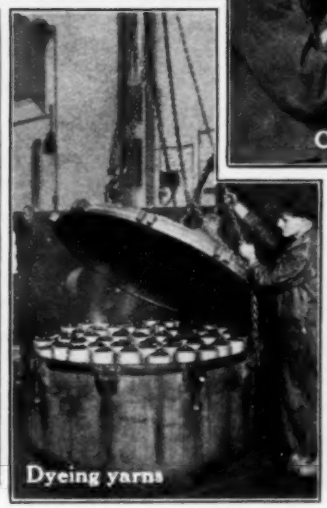
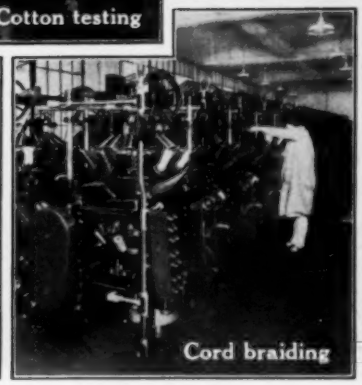


Fig. 1—Proper method of setting treated poles

Only a telephone cord..

... but see what's behind it!





JUST a few feet of insulated wire leading from your telephone to the bell-box—but back of it is a long story of careful workmanship and alert inspection.

Cotton was grown and silk was spun to make that insulation. Wire was drawn into the finest tinsel, covered with the dyed threads, and twisted and braided. It was all done right, because the cord must be rugged enough to take a good many pinchings by desk drawers and still keep on playing its part in a telephone conversation.

This cord is a little thing. But it is just as important to good telephone service as is a fifty-position switchboard or a thousand mile cable. And Western Electric makes it with the same care.

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with about a foot of the treated part above ground as decay always starts at the ground level. Fig. 1 shows the various methods of setting poles that have the butts treated and the effects on their life. Sketch "A" shows a pole with the treated part all below the ground level; "B" the decay at the ground level after a few years' service; "C" the treated part flush with the ground level and "D" the action of the decay. "E" shows a pole set properly so that even though it be banked with earth to any reasonable height above ground level the treated part will still extend well beyond the earth. The following table shows the minimum length the butt treatment should extend on various length of poles.

Length of pole. Feet.	Length of treated section. Feet.
20 or less	5½
25	6
30	6½
35	7
40	7
45	7½
50	8
55	8½
60	9
65	9½
70	10

Clearing Right-of-Way.

It is always best to clear the right-of-way of all limbs and brush that are likely to interfere with the proper clearance of the line after the wire has been strung. This should be done before the poles are set if possible as it eliminates difficulties in pole setting and wire stringing. Trees that are impossible to clear should either be trimmed or cut down. As they are generally expensive if they can be purchased at all, it is always best to route the lines so as to clear all of them possible. Neither is the shortest route always the cheapest as consideration must be given to the accessibility both for the construction of the line and later in covering it on maintenance and trouble.

Staking Out the Line.

After the right-of-way is cleared the next thing is staking out the holes. The hole locations must be in line and all properly spaced before the digging is started.

This can be accomplished with a surveyor's transit or by using flag poles, which is much simpler and is usually just as good. When a line is to be laid out between two points, flags should be located in line as far apart as possible to view both of them as "A" and "F" in Fig. 2. The man sighting out the line should stand a few feet back of flag "A" and in line with both it and flag "F." The length of span desired should be measured from "A" to "B" and the second hole located at "B." The man on the front end of the tape line or surveyor's chain, if one is being used, should set up a flag at "B" and the man sighting in the line from "A" should give signals to move the flag to one side or the other until "B" is in direct line with "A" and "F." A small stake should be driven at this point and if the flag "F" is difficult to see it is advisable to leave flag at "B" and locate the third hole at "C" in the same manner that "B" was located. The man sighting can then move from "A" to "B" and the flag from "A" can be moved ahead to "D" and so on until flag "F" is reached. This system of using three flags insures a straight line at all times. The two poles "D" and "E" in the drawing represent ten or more poles in actual practice. Of course the flag "F" should be eliminated and the three flag method only used, but the line might not come out at the exact location on the end of the line, especially if a slight error had been made at any point. This would make necessary starting again from the beginning and staking out the entire line.

Fig. 2—Staking out pole line

The size of the lead; that is, the number of crossarms it will ever be expected to carry, will be a factor in determining the length of the spans. They are usually shortened when crossing railroads, highways, etc. If a standard spacing is to be used when a line is laid out it is usually found that shorter span will come at the corner. This is satisfactory and a span of the same length should be measured off from the corner to the first pole in the section of line that is laid off from it. If a span of 150 feet is being used and the last span before the corner measures 200 feet then it is best to go back and space the last four spans at 162½ feet so that the additional 50 feet will be taken care of without an extra short or long span in the line. Of course the distance between two corners can be measured off before the poles are located and the spans equally divided so that all will come out even but this additional work is not usually considered necessary. Ordinarily spans in an open wire lead should not be shorter than 120 feet or longer than 175 feet. Of course there are many cases where much longer spans are used, but I have never considered that one over 150 feet would prove economical except on a small lead of one or two bracket circuits.

Digging Holes.

While we must all admit that power hole diggers are a mighty fine thing and prove their worth on any large job where the nature of the soil will permit their use, they are not always available for the use of the small or medium sized exchange. In this case the holes must be dug by the use of the long handle shovel, spoon and digging bar, plus plenty of man power. In some soils for certain size holes special hand diggers and earth augers may be used to advantage. In anything except rock which cannot be dug with a shovel I prefer a "Slick" to the ordinary digging bar. This tool consists of a sharp steel blade about 4 by ½ inches mounted on a wood handle similar to a shovel. This tool not only digs much faster than a bar but is also much easier on the man doing the work.

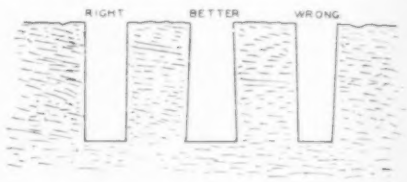

Fig. 3—Proper method of digging holes

The hole should always be dug exactly on the line with the stake in its exact center. The hole must be large enough in diameter to permit the free entrance of the pole and should allow at least three inches of dirt to be tamped in on all sides. There is usually a tendency to pull holes in at the bottom. This is especially true of the deep ones. This practice should always be avoided as it does not permit the butt of the pole to be shifted either way so that the pole can be placed in direct line. The pole will also bind in the hole and make its turning difficult to line up the crossarms. If anything the bottom of the hole should be larger than the top but if it is large

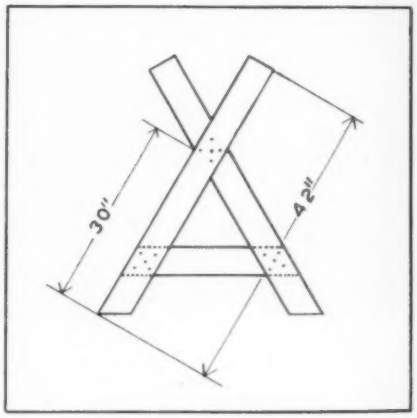

Fig. 4—Framing horse

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THE *Crapo* name on Telephone Wire and Strand signifies the ultimate in galvanizing. It denotes perfect adhesion of the pure zinc coating... consequent longer life...lower maintenance cost.

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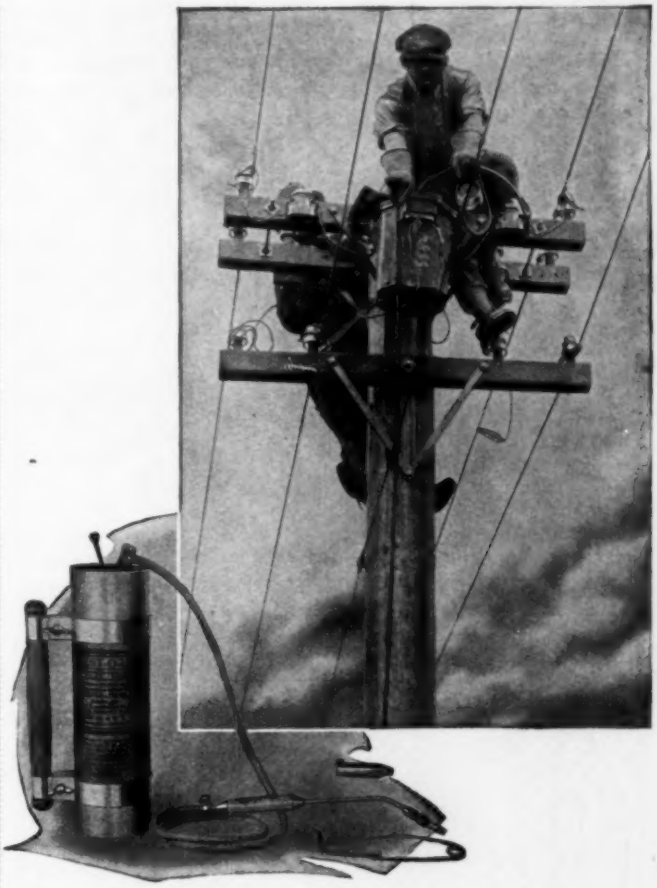

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Utility men throughout the country are using Prest-O-Lite. With its hot, concentrated, easily controlled flame, they are handling the most delicate work without heating or burning adjacent parts. They are cutting the time and cost of soldering, brazing, and heating operations and doing a better job.

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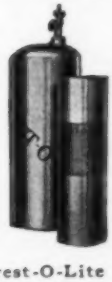

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enough and the sides straight to the bottom it will be satisfactory. See Fig. 3. Holes should be dug to the depth specified in the following table, which is generally considered standard for the various lengths of poles:

Pole length. Feet.	Depth in Earth. Feet.	Depth in rock. Feet.
20	4	3
25	5	3
30	5½	3½
35	6	4
40	6	4
45	6½	4½
50	7	4½
55	7	5
60	8	5
65	8½	6
70	9	6

Proper Clearance.

The obtaining of proper clearance in the construction of open wire line saves much time and money later. When planning to cross over a railroad track, tele-

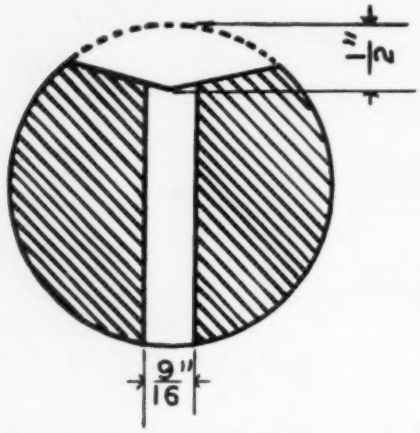


Fig. 5—Proper method of cutting gain in pole

graph or power line the construction foreman or some other designated representative of the telephone company should communicate with the company concerned several days in advance and advise them as to the proposed plans of crossing and endeavor to co-operate with them to avoid any unnecessary delay or misunderstanding. All clearances specified should be considered at a temperature of 60 degrees with no wind blowing.

When crossing over a railroad track a clearance of 27 feet from the rail top to the wires should be maintained. Ordinarily the poles on a railroad crossing will not be more than 75 feet from the farthest rail of the track. When possible it is best to limit the crossing span to 100 feet. The crossing poles should clear the rail from the side at least 12 feet on main line tracks and at least seven feet on side tracks.

All railroad crossing poles should be kept free from grass and rubbish at the base to reduce the chance of damage by fire.

Telephone open wire lines should clear all commercial power lines of voltages up to 7,500 volts at least four feet and all voltages of 7,500 to 50,000 volts at least six feet.

Poles over a crossing of any kind should always, if possible, be placed in a straight line.

Double crossarms with wire tied in on both insulators is always advisable over a railroad or power crossing. If a bracket circuit is being strung then double brackets should be used.

It is always advisable not to splice wires in a crossing span or the span on either side of it.

Framing Poles.

Poles should be framed in the pole yard if possible and always before they are set. A small framing horse can be constructed out of a few pieces of 2x4 or crossarms. See Fig. 4. Very few poles are perfectly straight and the majority of them have a slight curve. The concave side of the pole is called the "face" and the convex side the "back." The crossarms should be placed on the face of the pole and that leaves the straight sides of the pole so that they can be set in the line properly. The top of the pole is placed in the framing horse and the weight will automatically pull the back of the pole to the bottom so that the face will be on top in the correct position for cutting the gains. The roof of the pole should first be marked off on a 90 degree angle with the steel square and then sawed with a coarse 26 inch hand saw.

The number of crossarms which it is expected to use at any time during the life of the pole should be determined and that number of gains cut before the pole is set. It is a slow, painful operation to cut gains in poles standing. The gains

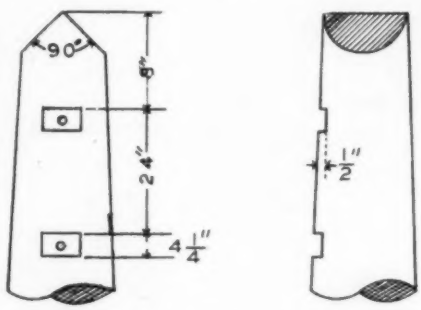
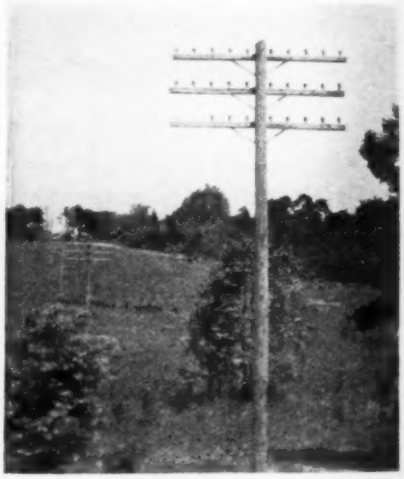


Fig. 6—Framing poles

should be measured off with the steel square and cut to a depth of about one-half inch with the saw. These should then be cut out with a two-inch wood chisel and this operation is quite a trick. Gains should be cut from the center; that is, a "V" should be grooved out first, in the center, and gradually widened until the gain is of proper width and depth. See Fig. 5. When more than one gain is cut in a pole these should be lined up by placing the square on edge in one and the chisel in the other and sighting across the top. The high side of the lower gain can be shaved away until they are exactly in line. When the gains are cut low in the center they will have a tendency

Trees cut down to obtain clearance right-of-way

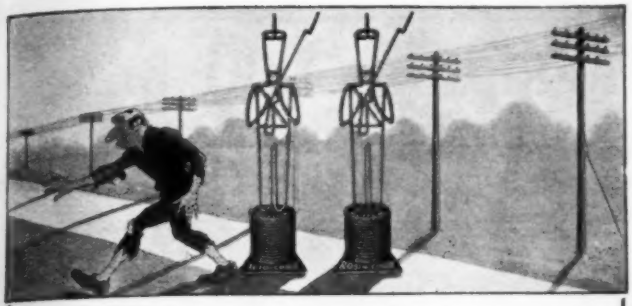
to clamp the crossarms to the pole so that it will not wiggle sideways. The two-inch chisel can be used to mark the center of the gain for drilling the hole



Line through scattered timber. All trees and brush under line cut down

for the through bolt. It is generally best to bore all gains before the pole is set, but some prefer to drill only the ones that are used immediately and then drill the others as needed. These holes can be drilled easily with the pole standing so this does not make so much difference. Fig. 6 shows the usual method used in roofing and gaining poles. Iron gains are now on the market with which it is only necessary to drill a hole for the through bolt and the special type gains when the bolt is tightened brings the crossarm in line. This makes a good job and with much less labor than the old method.

If the pole is untreated or if in cutting the gains and the roof the impregnated part is cut through, all gains and roof should be brush treated with creosote.



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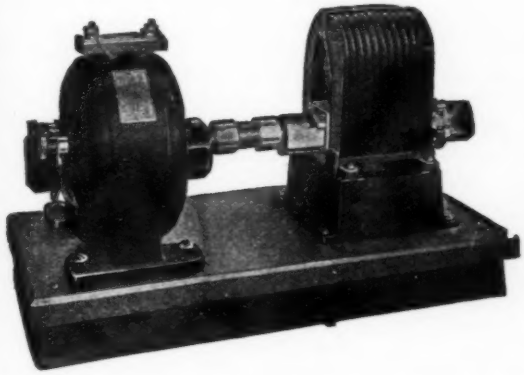

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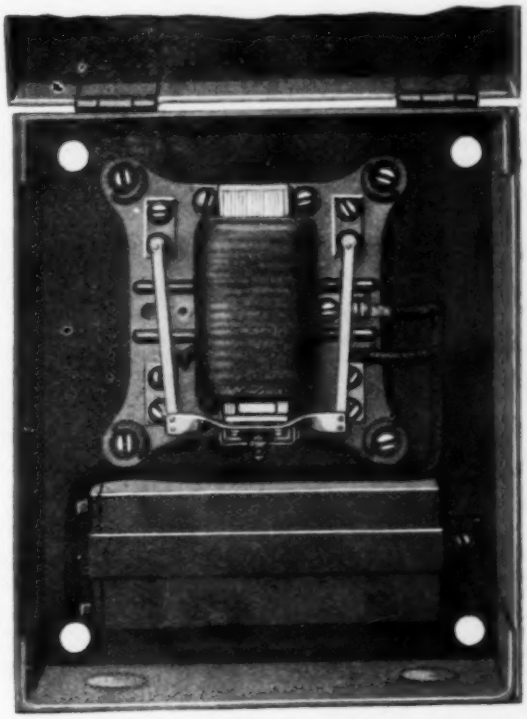

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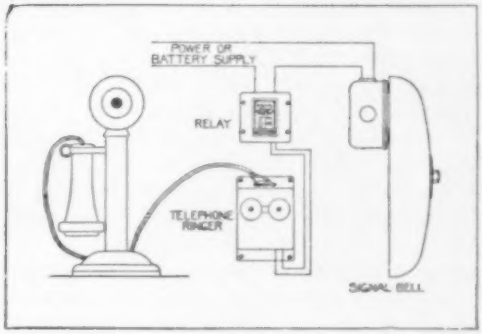

Diagram shows set connected to subscriber's telephone.

Samples for test to Telephone Companies

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Who's Who in the Telephone Business

J. WARREN SAFFORD

An Appreciation by B. T. Sherk

In previous articles under the above caption we commented on the many instances that could be cited where outstanding characters in the industrial fields started their business careers in certain lines of endeavor only to switch over in later years to new fields in which they became leaders in their new chosen professions.

Turn about is fair play, so this month we are going to present a gentleman who it seems from the record started in his present field as a boy and has stuck to it ever since. The subject of our story this month was born and raised in the Buckeye State.

We refer to Mr. J. Warren Safford, president and general manager of the Troy Telephone Company, Troy, Ohio.

Mr. Safford was born June 23, 1883, in Somerset, Perry county, Ohio. Here he attended the public schools and graduated in the class of 1901—at the age of 18.

Shortly after graduating he accepted a position as night operator with The Central Union Telephone Company where he advanced progressively, and upon the completion of the Somerset Exchange received an appointment as manager of this exchange. In 1905 he was transferred to Columbus, Ohio, where he assumed duties in the office of the division line foreman.

His ambitions carried him along and later we find him as manager of the Nelsonville, Ohio, and Buchtol, Ohio, exchanges of the Bell system.

Again we find him with growing pains in September, 1908, when he resigned his position with the Central Union Telephone Company, accepting the management of the Troy Telephone Co.—that was twenty years ago.

Since then he has continued to climb the ladder of success in his chosen field, and on February 7, 1916, we find him appointed as a director of the company and made secretary and general manager. Then years later he was elected president and general manager—that was on April 12, 1926, in which capacity he still holds forth.

The records further show that on December 5, 1922, Mr. Safford was made a director of the Tippecanoe Telephone Co. of Tippecanoe City, Ohio, and one year later (January 9, 1923) was elected secretary and treasurer, then again three years later (April 13, 1926), was elected president and general manager.

J. Warren Safford

On January 13, 1926, Mr. Safford was elected vice-president and engineer of The Greenfield Telephone Company, of Greenfield, Ohio. Subsequently he was elected general manager of the West Milton Telephone Company of West Milton, Ohio.

Mr. Safford served as a director of The Ohio Independent Telephone Association for a number of years—and through his aggressiveness was elected to the office of vice-president in April, 1927—then a year later (April 12, 1928) he became president of that association.

Outside of his telephone life he is a charter member and a past president of his Rotarian Club. Is now president of The Troy Business Men's Association and is a past secretary of the Chamber of Commerce. Was member of the Miami County Fuel and Food Administration during the World War.

He is president of the Troy park commissioners, is a member of the First Presbyterian church, and a Republican who of course has his hobbies—dramatics and theatricals.

Mr. Safford has reached the sublime degree of a 32nd Degree Mason and as such has learned that with the spirit of Easter time will come a deeper thought. To us the spirit of the season, the absorption of self and self interests into the consideration of others, will not come simply as the following out of an old-time custom, limited to days and seasons, but with the thought will come a wider knowledge, born of the understanding of our Masonic heritage, breaths from the purity of the far away heights from whence it came—that in this Easter season—a season of forgetfulness of self, there is but typified one more mysterious plan of the Divine—yet not mysterious—but sent to open up the hearts of men, that in their ministrations to the need of others, each may be drawn to greater and continued service, and through its blessing nearer to the God they serve.

Out there, beyond the radius of our friends and relatives, will be the sick and needy, the unfortunate and distressed. Out there beyond the range of Easter joy will be the little faces—pinched and wistful, tear-stained and worn with hardship—of them the Master said, "Of such as the Kingdom of Heaven."

And now with the faith that He in whom our faith is founded will open up to each the rich, bright paths of opportunity, let us express the hope and prayer that the spirit of Easter time may enter deep into our hearts—and there abide—bearing fruit, both now and in the years to come, may each with noble, pure and steadfast purpose build high and sure in fashioning out the temple of his chosen calling.

Leaflet Shows Growth of Athens, Ohio, Exchange

The Athens Home Telephone Company, Athens, Ohio, recently paid its' 87th quarterly dividend upon preferred stock. The report also showed that its list of patrons was increasing almost an average of one each day. This is a record for a city the size of Athens, where the possibilities are limited. And it stands out almost along in the number of consecutive dividends paid.

Annual Meeting Telephone Pioneers of America Announced

The 8th meeting of the General Assembly and the 16th meeting of the Telephone Pioneers of America will be held at Minneapolis, Minn., October 18th and 19th, 1929, with headquarters at the Nicollet hotel.

A new carrier and telephone system from Montreal to Vancouver, and intermediate points, is to be installed for Canadian Pacific interests, according to John McMillan, general manager of Canadian Pacific Telegraphs.

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have faithfully served the Telephone Industry for the past 35 years.

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THE "STEWART" TEST SET
Saves Money

Also, Cable Testers, Test Cabinets and Detecto-Meters.

By telling which way and how far trouble is from the tester without opening the line. Saves miles of driving over bad roads, locates trouble quickly and easily.

Has transmitter, receiver, generator, induction coil, battery, etc., and talks up as good as a telephone.

One lineman with a "STEWART" Test Set can locate more trouble in a day than two men could without it. Write for circular.

Sent on trial.

STEWART BROTHERS
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"BLACK BEAUTY" POLES

Cost less per mile, per year, than untreated poles of any species.

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"COPPERWELD" Twisted Pair Drop Wire

The long life drop wire

The steel core of Copperweld Wire gives strength to withstand sleet and wind loadings, while the copper prevents rusting and insures uninterrupted, clear speech transmission.

The exterior thick layer of copper on Copperweld wire is *molten welded* to the strong steel core. There never has been, nor is there now, any other "copper-covered steel" or "copper-clad steel" made like Copperweld—by the Molten Welding Process.

Data on Copperweld Insulated Drop Wire will be sent on request

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LINE AND DESK

A WIPER CORD TESTER

As automatic telephone equipment is coming into general use throughout the country, the method of maintenance has also rapidly improved in order to cut the cost of operation to the minimum.

The most efficient methods of inspections and locating the trouble are naturally developed in the field, and many handy devices are used which can be built from the material found in every exchange at a very small cost.

Open wiper cords are important trouble items in all automatic exchanges, and many methods have been used to locate the defective wiper cords before the last strand has broken.

The sketch will show the circuit used by the writer. Even a single broken strand in the wiper cord can be detected by a scratching sound in the receiver, when the wiper cord is shaken. If any of the strands are broken it will be but a few weeks until all are broken, as the cord will be more easily bent at this weakened point.

By the use of this wiper cord tester defective cords can be located and replaced before they cause the subscribers any trouble.

A few remarks is all that seems necessary, as the circuit is so simple. It was found necessary to short circuit the receiver while connecting the clips to the wiper terminals (or spring, as the case may be) to prevent a loud click in the receiver. This was accomplished by taping or wrapping a spring to the shell of a two-conductor switchboard plug, using the spring for one conductor and the sleeve for the other. These are held in contact while the tip of the plug is connected to the wiper cord terminal by the steel spring clip which is soldered to the tip of the cord. This spring tip is a No. 25 Denison cord holder and can be purchased at any stationery store. On the old type of switch it will be necessary to connect to the "D" relay springs and a spring-connector should be used.

The wire to either end of the wiper cord should be a No. 16 or 18 gauge, as there is a heavy current flow. If these wires are too small or long the set will not be sensitive enough to locate a single broken strand.

The Ford spark coil can be purchased from any automobile wrecking company. —Contributed by A. M. Brill.

SERVICE INCLUDES COURTESY KINDNESS

It would be a great misunderstanding to suppose that service stops in providing a most modern system of communication, or selling additional telephone service. Undoubtedly you have felt the effects of dealing with a cheerful person—that person thrills you through and through—you forget your worries and troubles and carry away with you a sublime feeling of appreciation. Not all of us can be cheerful, but at our worst we can be courteous and kind. It is these personal contacts and common influences that must be recognized as the intangible service to the public. Behind all intangible service you have courtesy and kindness.

Improvements in the means of communication bring the inhabitants of distant places into personal contact and keep up a rapid flow of changes of residence between one place and another. Every extension of education promotes personal contact, because education brings people under common influences, and gives them access to the general stock of facts and sentiments. In this age of progression you must acquire the habit of courtesy and politeness in your personal contacts and dealings with the public.

If you show an interest in the person you are dealing with by being courteous you have made the initial step toward making a friend.—William A. Hixon in The Transmitter.

A LOT OF BUNK

By Robert Davidson, in Transmitter

"A lot of bunk," the young man said,
As he slumped in his chair and nodded his head,
And he tossed his Specification Book
Into a dark and dusty nook.
Then he picked up a red-hot magazine,
Which had the latest "Confessions" in.

"And why should I," he mumbled low,
"Waste a lot of my time on stuff I know?
"I've set up many a telephone,
"And I spent three years in a gang, alone!
"It's up to me to enjoy some fun,
"For the day's work ends when the day is done!"

Yet, e'er he settled himself to read,
The young man thought of many a deed
He had put across and still got by.
(Oh, he could fool 'em and not half try!)
And he chuckled a wily chuckle and wise
At the lack of sight in his boss' eyes.

But payroll changes came rolling 'round,
Nor was his name on the listing found,
And, though the promotions scroll was long,
His face wasn't found within that throng.
And he claimed the boss wouldn't give him a chance.
(What he really deserved was a kick in the pants!)

CREOSOTED POLES IN MEXICO RESIST TERMITES

In many portions of Mexico the termite presents a most serious problem to users of wood in any form, and in certain districts is so prevalent that untreated wood has an average life of not more than one year. In the Tampico district this insect is very common, and even furniture is destroyed in a short time. It is claimed that "Spanish cedar" and certain species of native timber are quite resistant, but most timber used untreated for railroad ties, poles, cross arms, etc., is quite subject to attack and is very short lived. In this region untreated poles proved so unsatisfactory that the Tampico Electric Company, which renders both rural and city service, is now using only creosoted poles.

The creosoted poles in the Tampico-Miramar line of this company are in one of the worst termite-infested regions of Mexico. During the World War, when creosoted material was difficult to obtain, various classes of poles were tried in the lines of the Tampico Electric Company, including steel, but none of them was satisfactory. These creosoted poles have now been in service about 13½ years, during which time there has been practically no loss from termite attack. While the Tampico Electric Company has had no loss from termites, the Eagle Oil Company estimates its loss from termite destruction of untreated timber at more than one hundred thousand dollars.—Wood Preserving News.

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Super-Service on rush orders!

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Quality poles since 1882 assures you of guaranteed stock and satisfactory dealings. Let us quote you prices.
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There Are No Better Poles Than Those Produced by
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CHANCE MAKE BETTER ANCHORS POLE LINES
A Type and Size To Meet Every Need
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Ramblings

By J. A. S.

Yes, we're back from the "you-all" country; that's what the fellows from the effete East call those sturdy residents below the Mason and Dixon's line—we mean these birds who still believe that Indians roam the prairies of Oklahoma and that cowboys kill the "tenderfoot" who dares to invade the sacred precincts of Texas' vast open spaces. And we enjoyed every minute of the time we spent in the states to the south of Missouri; but we are glad to be back. Covering Missouri, Kansas, Oklahoma, Texas, Arkansas, Tennessee, Kentucky and Illinois in our ramblings, we found many things of interest—the roads, for instance. Crossing the Red river into Arkansas, we were charged "four bits" for the privilege of riding the ferry across that muddy stream. And passing from Little Rock to Memphis, we passed through miles of country under water from the Mississippi floods; some of the roads were under water, with only stakes to guide us from one bridge to another. But what struck us most forcibly in that section was the number of punctures to the mile—and the advanced prices for repairs. Sometimes we thought there must be collusion between the repair shops and the dispensers of tacks, but this is probably imagination.

* * *

Down at the Oklahoma convention we were treated to a new thrill; C. G. Gardner, that "rattling good Ford" driver who covers "them" parts for the Kellogg Switchboard & Supply Company, was the happy father of a new baseball moustache; one of those new fangled ones located somewhere between the nose and the mouth with a driveway immediately under the nose, followed by a narrow hedge called moustache in polite circles. Gardner stood up well under the barrage of good natured sallies by his friends; but the cause of this merriment had disappeared when he arrived at the Texas convention. * * *

E. J. Mendel, former auditor of the Oklahoma-Arkansas Telephone Company at Poteau, Okla., but later manager of advertising for the Suttle Equipment Company at Lawrenceville, Ill., is back in Arkansas after spending a few months in Illinois. He is said to be connected with the Albert Mendel Company of Little Rock, Ark. We understand that he has been confined to a sanitarium where he underwent an operation for appendicitis, but is able to resume his duties again. Mendel thought he would like to take up the work of publicity agent, but after a few months at this class of work he returned to his former state to reside.

It is not our custom to mention persons in this column who are not in some way connected with the telephone business, and we hope our readers will forgive us for this digression, but in our ramblings through Oklahoma we had the extreme good pleasure to pay a visit to our former employer (and still our friend), George Smith, of Fort Gibson, Okla. Going to that state from Texas we met George, who hailed from Kansas, where so many politicians originate; true to form, he was inoculated with the germ which causes so many good men to go wrong—politics. George didn't go wrong, so he could not be classed as a successful politician; he is not yet a rich man. But he has held several important jobs in Oklahoma, among them county treasurer, assistant state treasurer, state game warden, secretary of the state school land department, manager of the state Democratic press bureau, and successfully managed more than one campaign for state office by those who were elected and escaped impeachment in that turbulent state. George now lives on a farm near Fort Gibson and in his spare time sells deer meat at a dear price. But the fact that he has been through all these storm battles and still remains a poor man should forever stamp him as thoroughly honest. And we are glad that we have worked for and with him.

* * *

While attending the Oklahoma convention we again had the pleasure of meeting Campbell Russell, former member of the corporation commission of that state and one of the darnedest "referendum" advocates to invade any state. For years and years he has been either running for office or initiating some new reform to be voted on by the people. But such is life. Probably if he had not been so engaged he would have been trying to impeach somebody. This fellow Russell several years ago gained considerable notoriety by appearing in one of the Fred Harvey restaurants in his state minus his coat and insisted on being served. He was refused service and brought suit against the organization for damages.

* * *

At the annual luncheon of the Texas Independent Telephone Association, C. A. Shock, general manager of the Northern Texas Telephone Company with headquarters at Sherman, was presented with a specially designed watch containing twenty-five jewels to commemorate the twenty-fifth anniversary of his entrance into the telephone business; the memento was the gift of co-workers of Mr. Shock and was presented by J. B. Earl of Waco. Mr. Shock has served for several years as a director of the United States Independent Telephone Association.

One of the disappointments of the Texas convention was the inability of J. E. Farnsworth to be present at the luncheon where he was scheduled as the principal speaker. On account of sickness Uncle Joe was forced to remain in his hotel at Corpus Christi, where he is said to be recuperating from the strain of attending the regular session of the Texas legislature. Uncle Joe served the Southwestern Bell some forty years in different capacities, and for many years has held the title of vice-president; about two years ago he was retired from active service, but on account of good judgment and his fairness to the Independents of his state, he still represents his company before the legislature at all its sessions. Because of J. E. Farnsworth, the Independent interests of Texas and adjoining states are in better shape than they might have been had another guided the destinies of the A. T. & T. subsidiary in the Lone Star state.

* * *

Chester Sells, salesman for the Automatic Electric Company and who represents that concern at the different state conventions, was somewhat under the weather at the Oklahoma convention; he was suffering from a lame foot which prevented his usual activities at that gathering. However, he was somewhat improved when seen at the Texas convention two weeks later.

* * *

C. A. Heiser, for many years with the Southwest General Electric Company at Dallas, is now representing the Oliver Iron & Steel Corporation in the Southwestern territory. He's a dandy good salesman and a first class gentleman as well, and will put the job over if it can be done in that section.

* * *

"Program Service—Its Possibilities and Probabilities" will be discussed in future issues of TELEPHONE ENGINEER. Mr. R. S. Brewster of Lincoln, Neb., is preparing a series of articles touching this subject, the first to appear in the May issue. It is agreed that there are possibilities for this service and that if the telephone companies do not take advantage of the opportunities offered the power and light companies may step in and pick the plums dangling before the very eyes of the telephone industry. We advise you to read these articles very carefully. * * *

William C. Grant of Dallas, Texas, director of the Texas Public Service Information Bureau, has resigned to accept a position with the Lone Star Gas Company. He will be engaged in public relations work for the Lone Star and subsidiary companies and will have headquarters in Dallas. Mr. Grant has been director of the Texas bureau since June 1, 1927, having succeeded the late George McQuaid of Dallas.

Oklahoma Utilities Association Holds Convention With Large Attendance

The largest and best convention in the history of the Oklahoma Utilities Association was held at the Huckins Hotel, Oklahoma City, March 12-14, 1929. The convention resulted in a definite addition to the work of the Oklahoma Utilities Association through creation of an accident prevention section in response to a request presented to the executive board from executives and employes who are now conducting safety work in their organization and who wish to see it extended to other companies which do not now have active accident prevention organizations. The new section is also created for interchanging ideas and experiences among members on accident prevention and health work. Another objective to the section will be to instruct the public on the subject of accident prevention and health improvement in order to bring about greater cooperation with the companies along these lines.

L. W. Scherer of Watonga, retiring president of the Association, presided at the general sessions, which were held Tuesday, Wednesday and Thursday mornings and Thursday afternoon.

An interesting feature of the last two days of the convention was a Televox demonstration by J. L. McCoy of the Westinghouse Electric & Manufacturing Company. Delegations of high school and university students attended these demonstrations in addition to all of the delegates to the convention who could crowd into the assembly room.

Mr. Televox, responding to whistles of various pitch through a telephone, started and stopped various household electrical devices and also sounded an automobile horn and turned on a floodlight. Mr. McCoy stated that Televox was not designed as a household servant, but chiefly to replace men in operation of electric substations and small plants and in other industrial operations.

The telephone division met Tuesday afternoon, all day Wednesday and Thursday morning. Joseph M. Nelson, Yale, chairman of the division, presided. Among subjects presented in the telephone division were: "Problems of Building an Organization" by Minor Corman, Dallas, Texas, Kellogg Switchboard & Supply Company; "Maintenance as a Business Builder" by J. L. Zeeg, Watonga, United Telephone Corporation; "Rural Telephone Development" by G. E. Sites, Dallas, Texas, Southwest Telephone Company; "Safety First" by W. O. Mills, Skiatook, Standard Telephone & Telegraph Company; "Financing of Small Telephone Companies" by T. W. Alexander, Duke, Peoples Telephone Exchange; "Selling Telephone Service" by R. J. Benzel, Oklahoma City, Southwestern Bell Telephone Company; "1928 Association Activities" by H. W. Hubenthal, Oklahoma City, Oklahoma Utilities Association; "A Jar of Beans" by H. F. Rehg, Salina, Kansas, The Midland, The Western and The Central West Missouri Telephone Companies; "Rules and Regulations for Telephone Companies" by B. Richardson, Oklahoma City, Telephone Engineer, Oklahoma Corporation Commission; "Traffic Engineering" by E. R. Stonaker, Rochester, N. Y., Stromberg-Carlson Telephone Manufacturing Company; "Rural Zoning for Equitable Rates" by Harry N. Faris, Abilene, Kansas, United Telephone and Electric Company; "Remote Control Units" by H. A. White, Kansas City, American Electric Company, Inc. A traffic conference was conducted by Miss Anne Barnes, Des Moines, Iowa, Traveling Representative, United States Independent Telephone Association. Miss Barnes also addressed the telephone division on the subject "The Spirit of Friendliness." F. B. MacKinnon, Chicago, President United States Independent Telephone Association, extended greetings to the telephone division.

Each division held a business meeting Wednesday afternoon and selected their chairman and representatives on the Executive Board. The new Executive Board, as thus constituted, Thursday noon elected officers for the Association for the ensuing year, which were ratified at the business meeting Thursday afternoon. Officers were elected as follows: President—Thomas R. Weymouth, Tulsa, president, Oklahoma Natural Gas Corporation.

Telephone Division: Samuel Hand, Beggs, manager, Beggs Telephone Company.

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Kellogg Advances S. A. Mounteer

S. A. Mounteer, who has been associated with the telephone industry for approximately sixteen years, has been advanced to special sales representative for the Kellogg Switchboard & Supply Company. Previous to this appointment Mr. Mounteer was for a number of years in charge of the Kellogg Company's switchboard sales division.

A. J. Parlett, a practical telephone engineer, who has been associated with Mr. Mounteer in switchboard sales work, has been given charge of the switchboard sales department. Mr. Parlett's experience includes a number of years with operating companies in various capacities.

Mr. J. T. Walker, formerly of the Portage Telephone Company of Portage, Wis., has recently joined the switchboard sales department staff of the Kellogg company. He will assist Mr. Parlett.

Booklet Describes "Telering"

The Colson Company, Elyria, Ohio, has just issued a booklet describing "Telering," which was placed upon the market the first of the year. This apparatus is used for all telephone ringing purposes, and it is claimed by the manufacturers that the first cost is practically the only cost. This booklet describes the principle of operation, installation instructions, description and diagrams, so that anyone studying the contents of the booklet may understand every phase of this apparatus. Write to the Colson Company, Elyria, Ohio, for a copy of this booklet.

Frank A. Knapp, who until a few months ago headed the largest group of Independent telephone properties in Ohio, was recently elected president of the Bellevue Savings Bank. This is the home of Mr. Knapp.

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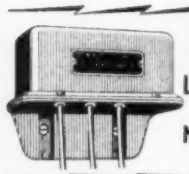

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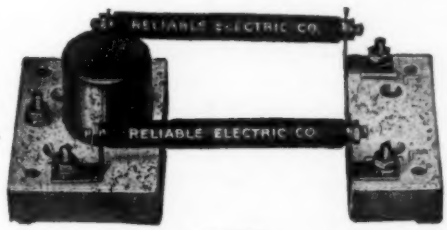

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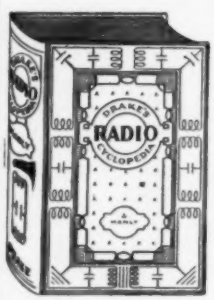

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